FLIGHT
and
AIRCRAFT ENGINEER

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The Outlook

Helicopter Progress

WESTLAND AIRCRAFT, LTD., and the various Government departments concerned are to be congratulated on the decision to build the Sikorsky S.51 helicopter in this country. Two of these machines were demonstrated in London last week, as recorded elsewhere in this issue, and although neither the original designers nor the British firm would claim that the S.51 is the last word in helicopter design, the demonstrations did reveal it as a really practical aircraft, provided it is handled by thoroughly trained pilots and maintained by experienced ground staffs.

The helicopter is, at present, expensive both in first cost and in upkeep; that is not to be denied. But it is fairly obvious that a reduction in manufacturing costs could come, and could only come, from production in fairly large quantities. In any case, it is futile to compare the helicopter with fixed-wing aircraft. The two are complementary, not competitive. The helicopter can do things which no other vehicle is capable of doing.

One of the most welcome aspects of this Anglo-American collaboration is the fact that the British company has the right not only to manufacture but to sell the Westland-Sikorsky in all countries except America and Canada. This so greatly extends the scope that one may hope for very considerable export business, so that the dollars expended on the licence should ultimately pay good dividends.

From the technical viewpoint also one may applaud the decision to secure this licence. The different types of helicopter being produced by the Bristol, Cierva and Fairey companies may have not inconsiderable advantages compared with the S.51. But for some time to come they must be regarded mainly as interesting and promising experiments. The Sikorsky has a lot of practical experience behind it, both in manufacture and operation, and the fact that a number will be available within a short time will give this country an opportunity to gain similar experience in whatever applications may be chosen.

That there are a great many functions which the helicopter can perform is obvious to anyone who has studied its possibilities. Its uses may be somewhat limited at home, although such obvious applications as mail deliveries to out-of-the-way places, passengers services to isolated islands, coastguard work and air-sea rescue immediately come to mind. If, however, one takes the world at large, the tasks that can be performed by the helicopter are almost innumerable. In many localities the question of cost will not be the primary one if, for instance, the helicopter is the only practicable means of communication. And there are many such.

Cross-wind Landing Gear

THE letter from Mr. T. P. Wright, Administrator of Civil Aeronautics in the United States, published in our issue of May 29th, and our Editorial comments on the subject of castering undercarriages, have aroused widespread interest. On the Correspondence page of this issue we publish letters from three readers, all of whom have had practical experience of this type of landing gear.

Apart from these, the Maclaren "drift undercarriage," as it was called, was tried on the Arpin light aircraft in 1938; and during the war, when Airwork, Ltd., took over the development, this pre-set undercarriage system was tested on several types of aircraft, single-engined and twins, including a Miles Magister, a Mustang and an Airspeed Oxford.

An interesting fact which emerges is that to obtain the full advantage from castering undercarriages the tricycle arrangement is preferable. In the "old-fashioned" type, with the main wheels ahead of the centre of gravity, directional control by the rudder is bound to cause some difficulty, especially on rough grass, or if there is a slight slope.

In view of the fact that America is taking the subject of cross-wind landing gear very seriously, and bearing in mind the very considerable volume of experience already existing in this country, it would appear that a re-examination of the subject by the appropriate authorities is desirable. Two applications are obvious: on large aircraft to enable them to use runways which are a number of degrees out of the wind; and on small civil types for the private owner who wants flying to be as simple as possible.

Power for Bombers

THERE is a feeling in America, where ultra-heavy long-range bombers, exemplified by the Consolidated Vultee B-36, are the subject of intensive development, that piston engines of around 5,000 h.p. might become critically important should another emergency occur within a few years. Already the large radial engine of about 3,000 h.p. has been assured of a useful future in American military aviation in having been selected to power the Boeing B-50.

It is not clear whether the 5,000 h.p. piston engine, represented by the experimental Lycoming XR-7755 (referred to by Messrs. King and Hawthorn in their recent paper, summarized in this issue) could be applied to the existing B-36, or whether a specially designed airframe would be demanded. Certain it is, however, that the U.S.A. will find herself in a far stronger position than Great Britain should very heavy piston-engined bombers be required in quantity within a few years.

The piston engine alone is at present capable of providing the speed, carrying capacity and—most important—range, demanded of a heavy bomber for strategic use, though the airscrew turbines now under development will soon begin to come into their own and with such units as the Armstrong Siddeley Python and Bristol Proteus, Great Britain should assume the lead in the development of high-output, airscrew-driving power plants. It has already been demonstrated in the U.S.A. that high-altitude cruising speeds of over 400 m.p.h. are attainable with existing large piston-engined aircraft.

There is no doubt that the Bomber Command re-equipment programme will specify turbine power plants in airframes specially designed for them, but a turbine-powered heavy bomber with the range and bomb load even of the Lincoln could hardly be in service before 1951. Meantime, should piston-engined bombers prove a pressing operational need, we might have to rely on medium-high-powered engines like the Bristol Centaurus and Rolls-Royce Eagle for which no suitable British airframe yet exists.

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"*Flight*" photograph.

TRINITY HOUSE UP-TO-DATE: Putting an engineer on board a light buoy, the light of which has been extinguished. At the Westland demonstrations described on the following pages, the S.51 circled until the light was burning again, when it hovered close to the buoy to pick up the engineer.

Convincing Demonstration of the Westland-Sikorsky S.51 : Greatly Improved Comfort

Illustrated by "Flight" Photographs

LONDONERS had a fine view of hovering flight on Wednesday and Thursday of last week when two Westland-Sikorsky S.51s were demonstrated in the vicinity of Hammersmith Bridge. Westland Aircraft, Ltd., had been fortunate enough to obtain the use of Harrods' sports ground at Barnes, which made an ideal site for the demonstrations, surrounded as it is by houses and trees, to lend realism to the unique characteristics of the helicopter, and with filter beds and the Thames itself as emergency "landing grounds" in case of any unlikely serious difficulty. Thus very convincing demonstrations could be given without the slightest risk to anyone on the ground.

Two American-built S.51s were flown non-stop up to the Harrods' sports ground from Yeovil, one piloted by Westland's chief helicopter pilot, S/L. A. Bristowe, and the other by S/L. P. Garner. The former machine, G-AJHW, is the property of Westlands, while the ownership of the second, G-AJOO, is still somewhat in doubt, a lot of official red tape having apparently become entangled in its rotor.

Production and Sales

As we announced some months ago, Westland Aircraft, Ltd., have obtained the licence to build the S.51 in this country, and to sell it in all the countries of the world except the United States and Canada. The intention is to build most of the airframe and other parts at Yeovil, although it may prove convenient to have certain specialists manufacture a few items for which they are already well equipped. If no unforeseen delays occur, it is expected to have the first British-built S.51 in the air some time next year. At present it has not been possible to settle the question of price, and it is doubtful if this can be definitely done until there is some experience of manufacturing costs. Present estimates indicate somewhere around £15,000. Experts from Sikorsky's have visited this country to explain the manufacturing methods employed in America, and large numbers of drawings have arrived, but it will necessarily take some time to get production really going.

The Sikorsky helicopter which is best known in this country is the R-4, which was in use at the R.A.F. helicopter school at Andover (an article appeared in *Flight* of July 5th, 1945). The S.51 is a great improvement on that type from every point of view. Powered by a Pratt and Whitney Wasp Junior rated at 450 h.p. at 2,300 r.p.m., it carries pilot and three passengers. The pilot sits in front, where his view is quite exceptionally good, while the passengers sit side by side behind him, in a very comfortable seat. The cabin is air-conditioned, and the soundproofing is very effective, so that it is possible for the occupants to converse without raising their voices very much. During a flight in G-AJOO it was observed that there is very little vibration transmitted to the cabin.

Mr. John Fearn, managing director of Westlands, welcomes his many guests.

Apart from the comfortable cabin layout, the S.51 shows several improvements on the R-4. The rotor head, for example, is a very different piece of work, and gives the impression of being a really fine engineering job. It retains the basic features of the earlier model, but the individual items are much more "finished."

Certain differences were also noted in the flight controls.

HELICOPTERING IN LONDON

In the R-4 the top of the "stick" describes a circular motion which transmits a deal of vibration to the pilot's hand. In the S.51 this has been damped, but the result is a certain stiffness or heaviness in the control. There is also a better interconnection between the pitch lever and the engine throttle, so that the pilot no longer needs to keep his eyes glued on the rotor rev. counter. The twist grip at the top of the pitch lever is now more of a vernier adjustment.

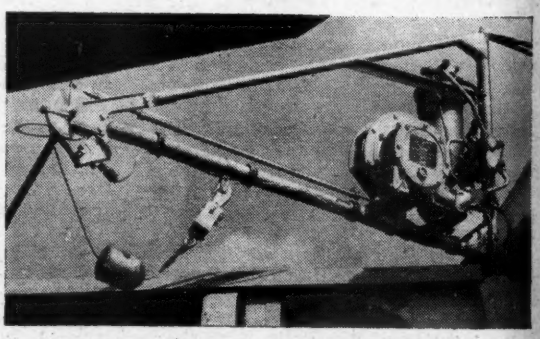
The Pratt and Whitney engine is mounted horizontally in the bay behind the cabin. It drives the main rotor via a gear box and clutches. The drive to the tail rotor lies in a duct on top of the fuselage, and the shaft incorporates universal joints made necessary by the angles in the shaft line caused by the relative positions of the engine and tail rotor. As already announced, the Alvis Leonides engine will be fitted in the British-built S.51s. This will slightly improve the power loading, as the Alvis engine is of greater power (500 h.p. at present). Some small amount of weight will, however, be sacrificed by the fact that, as the Leonides rotates the opposite way to the Wasp Junior, an extra gear will be necessary.

Improved Performance

From the performance point of view the S.51 is, of course, very much better than the R-4. With the Wasp Junior engine the tare weight is 3,735 lb, and as the maximum loaded weight is 4,985 lb, there is a disposable load of 1,250 lb. This can be used according to the service to be operated. For example, if a cruising range of 245 miles at 85 m.p.h. is needed, the payload becomes 390 lb, composed of two passengers and 50 lb of luggage. For a range of 150 miles the machine will carry three passengers and 70 lb of luggage, and for really short hops, say of 50 miles, the luggage or other cargo can go up to 280 lb. The cruising speed of 85 m.p.h. corresponds to 65 per cent of the engine power. The top speed, which is of no great importance in a helicopter, is about 103 m.p.h., and the landing speed is, of course, anything from zero upwards.

It is not always appreciated that a helicopter requires much more power for vertical than for slanting ascent, due to the fact that the airflow through the rotor disc changes a great deal. Similarly it requires more power for hovering than for slow forward flight. This fact is well brought out by the two ceiling figures. For hovering.

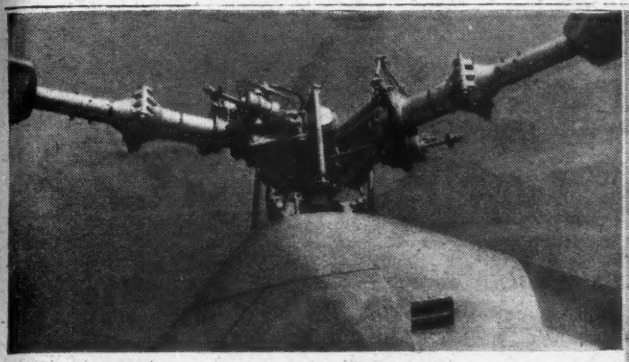
The lowest aerial view on record? In this group, photographed from a hovering Westland-Sikorsky S.51, Mr. A. Davenport, technical director of Westlands (right), Mr. Peter Masefield, Director-General of Long-Term Planning at the Ministry of Civil Aviation, and the editor of *Flight*, are just beginning to realize the possibilities of pest-destruction by helicopter.

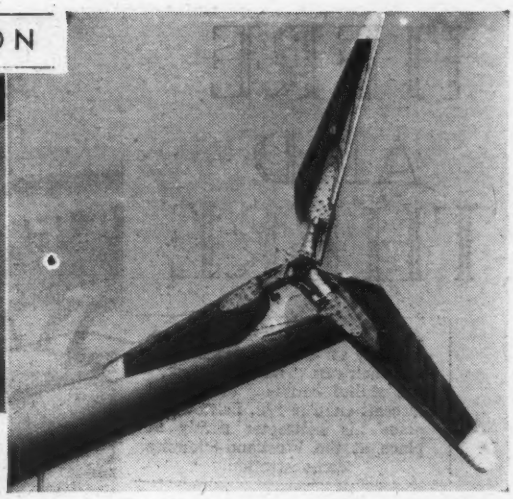


A special hoist on top of the fuselage of the S.51 is push-button operated by the pilot.

The demonstrations given at Harrods' sports ground included the transport of a section of a bridge to an otherwise inaccessible location.

HELICOPTERING IN LONDON

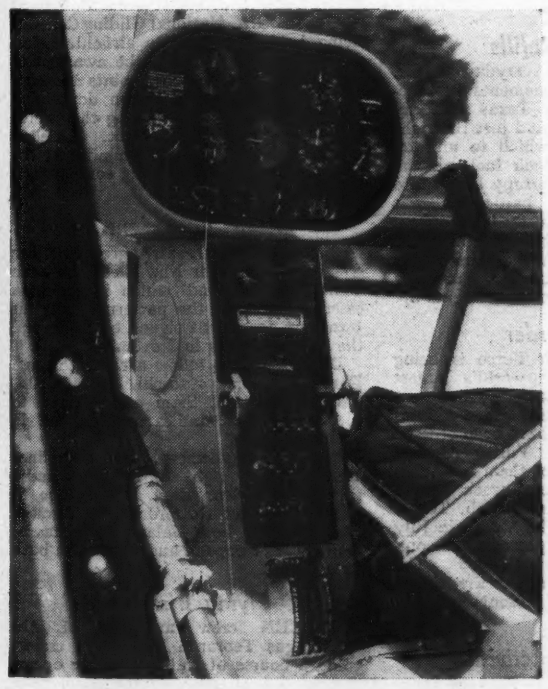




The new rotor head of the S.51 (above) is a much better engineering job than that of older models. Damping around the drag hinges is by oleo dashpots. The tail rotor on the right has laminated wooden blades.

the ceiling of the S.51 is about 5,000ft, while in forward flight this increases to 14,000ft. It is also reflected in the rates of climb, which are: vertical ascent, 600ft/min; climb with forward speed, 1,200ft/min; both from sea level.

At the demonstrations last week, extremely well organized by Mr. A. H. Williams, Westland's commercial manager, and his team, the usual displays were given by the two pilots: vertical take-offs, hovering, flying forwards, sideways and backwards. Many people were given their first taste of helicopter flying, and both pilots were working at a rate that was reminiscent of the early joy-ride days. S/L. Bristowe, who has gone through a helicopter course in America, and is thus the more experienced of the two, did the more difficult demonstrations, but S/L. Garner, who has mastered the S.51 in amazingly short time since the first one arrived at Yeovil, also inspires confidence by his handling of the machine.



The pedestal-mounted instrument panels on the S.51. The number of dials and switches may appear excessive, but it must be remembered that the machine carries two-way radio and that the cabin is air-conditioned. The pitch lever, interconnected with the throttle, is on the left, the flight-control lever in the centre. The pitch of the tail rotor is controlled by pedals.

By way of simulating some of the uses to which a helicopter can be put, a rubber dinghy was placed on the ground, and S/L. Bristowe came along, let down a winch cable and hoisted the "ditched" airman on board. Another demonstration took the form of lifting a section of a bridge across an imaginary ravine. A particularly convincing "act" was the adjustment of the light on a buoy, assumed to have gone out. The helicopter hovered near enough to the buoy for an engineer to transfer to it from the aircraft, which circled while the defect was being remedied. When the light was burning once more, the helicopter descended to within a couple of feet of the buoy, and the engineer climbed back on board. An example of a baulked landing was provided by a lorry driven right into the path of the helicopter, about to land. The aircraft was pulled up sharply and hovered while the lorry passed under it. For sheer precision flying the landing in a 16ft-wide space between rows of parked cars was the highlight of the demonstrations.

In addition to the flying display there was a static exhibition in Harrods' clubhouse. This included some interesting pictures showing helicopters at work, and a complete Leonides engine.

Official Support

Guest of Honour at the luncheon on Thursday was Sir Henry Self, Permanent Secretary, Ministry of Civil Aviation, present in place of Lord Nathan who was detained in Parliament. He was introduced by the chairman of the company, Lord Aberconway, and was among the many important persons to fly in one of the helicopters. Sir Henry made it clear in his characteristically knowledgeable speech that the Ministry of Civil Aviation is entirely in support of the Westland Company's venture. He said that the Corporations would learn the technique on available helicopters until such time as British designs reached the stages of production and perfection. The present arrangement was a short-term policy, and it was not the time for passenger services yet, but they would be worked up over a period and were worth-while long-term prospects. He believed that helicopters would be efficient in their own right.

Air Commodore E. H. Fielden, Captain of the King's Flight, and Mr. John Grierson, to whom the use of helicopters for whale spotting has been suggested, were among others who flew in the Westland-Sikorsky S.51s.

HERE AND THERE

ACCURATE PARKING: Fortunately for the enthusiasts who lent their cars to make a "park," the skilful handling of a good aircraft enabled S/L. Bristowe to place his helicopter neatly in place at the Westland-Sikorsky demonstration.

"Flight" photograph.

High Honour

TO mark his ten years' chairmanship of the Anglo-Swedish Society and his work for the extension of industrial and cultural relations between the two countries, Lord Sempill has been created an officer of the Grand Cross of the North Star, a high honour instituted by the Swedish Royal House 250 years ago. The investiture was made by Mr. B. G. Prytz, until recently Swedish Ambassador in Britain who made the journey to London specially for the occasion.

American Aircraft Show

THE 1947 American National Aircraft Show is scheduled to take place some time in November. Probable location of the show is Navy Pier, Chicago. It had been planned to hold two shows, one on the West Coast, another on the East, but now only one will take place.

Air-Road Tours

AIR CONTRACTORS, LTD., announce that motorists desirous of touring the Continent are now able to cut out all the trouble and delay involved in shipping their cars to the Continent. Early next month two people will drive their car to Croydon airport, straight into a Miles Aerovan, which will then fly the car and passengers to Le Touquet. Arrangements are thorough, even to the issue of petrol coupons, so that the car may be driven straight from the arrival airfield to the nearest town, where the Continental allowance of fuel is issued.

Things to Come

A MECHANICAL Handling Exhibition is to be held in the National Hall, Olympia, from 15th to 21st July, 1948. The exhibition, the first of its kind, is being promoted and organized on a non-profit basis by the monthly journal *Mechanical Handling*, published by the Louis Cassier Co., Ltd., an associated company of Iliffe and Sons Ltd.

Any surplus remaining after charging expenses will be refunded to exhibitors. Leading associations in the industry are collaborating with the organizers to make it completely comprehensive and national in scope and character. While special attention will be directed to the export trade neither effort nor expense will be spared in creating an exhibition that will be of outstanding value in the development of home markets.

Quart in a Pint Pot

DRAWING attention to our inscription to the photograph of the Ghost Vampire (June 12th, page 545), de Havillands assure us that, despite the extra 2,000lb of thrust, the fuselage of the Ghost Vampire is exactly the same diameter as that of the Goblin-engined version. The Ghost has a diameter just over 3in greater than the Goblin.

R.A.T.O. Refills

EXPLAINING, in everyday terms, production of fuel elements for take-off-assisting rockets, a Texas firm say that they were able to find just the right kind of asphalt with which to mix oil and chemical. The black fuel mixture was next poured as a syrupy liquid into a mould, and, after hardening, was wrapped in linen tape ready for insertion in the steel bottles which are attached to the aircraft. The asphalt keeps the mixture from exploding by feeding a little of the fuel at a time as it heats up.

Large Order

THE U.S. Army Air Force is being equipped with the world's largest bomber, the XB36, details of which were published in *Flight*, Jan. 9th. A hundred of these machines have been ordered from the Consolidated Vultee Aircraft Corporation—the first of them was scheduled to be finished last week at the company's plant in Fort Worth, Texas. It will be delivered to the A.A.F. in July and all deliveries are expected to be complete by the middle of 1949. The machines will be consigned to the Eighth Air Force which is at present equipped with Super Fortresses.

Netherlands Activities

FURTHER information has been made public of the Fokker Netherlands Associated Aircraft Factories, Inc., organized last February. Management will be in the hands of a board of commissioners composed of four members, three of whom will be selected as representatives of the three merging companies —Fokker, Aviolanda and Schelde—and the fourth member will be elected by common agreement.

Production of aircraft will continue at the Fokker factory in Amsterdam and the Aviolanda factory at Papendrecht until the proposed new factory is constructed. The new company is engaged in developing and producing passenger, training and military aircraft and in the repair and conversion of present types.

Free Service

CELLON, Ltd., is offering a prize at the B.G.A. National Gliding Contests being held at Bramcote airfield, Leics, June 21st-29th. It is to be awarded to the club scoring the most points and consists of 15 gallons of Cellon dopes and finishes to be supplied during the twelve months following the contest. A Cellon service van will be in attendance at the gliding contests for servicing competitors' machines free of charge.

Air Agreement

A RECIPROCAL air agreement has been signed in New Delhi between India and Holland which in its main essentials follows the pattern of the air transport agreement signed by India and the United States in November, 1946.

Dutch air lines follow a route through Europe, Persia, Karachi, New Delhi, Calcutta, Burma, Siam and Malaya to the Dutch East Indies and beyond in both directions.

Under the agreement, Indian air lines are given the right to fly from India through the Near East and Europe to Amsterdam and Rotterdam, or through Burma, Siam and Malaya to Batavia, Sourabaya, Koepang and beyond in both directions.

Flying Irishmen

FIFTEEN crew members of Aer Lingus Teoranta have been undergoing a course of training in the operation of four-engined aircraft under the tutelage of T.W.A. The trainees, comprising captains, first officers, flight engineers and radio operators, have been attending T.W.A.'s international training school at New Castle Airport to qualify them for operation of Constellations and Skymasters. The course gives captains and first officers

HERE AND THERE

about 127 hours of ground training, 35 hours' Link, 25 hours' flying in D.C.3s and 15 hours' flying in Constellations. A new training school has now been set up in this country (*Flight*, June 5th) for the training of civil aircrews.

"Caledonia" Souvenir

THE Institute of the Aeronautical Sciences, New York, is to receive from B.O.A.C. a museum piece in the form of a section of the wing spar from R.M.A. *Caledonia*, the first British flying-boat to make a commercial crossing of the North Atlantic. The section is inscribed with the total hours (14,524) and total miles (2,063,053) flown. The first experimental flight of the *Caledonia*, an Empire flying-boat, took place on July 5th-6th, 1937. She was commanded by Capt. A. S. Wilcockson, O.B.E., who is now B.O.A.C.'s Operations Controller.

Motor-Glider

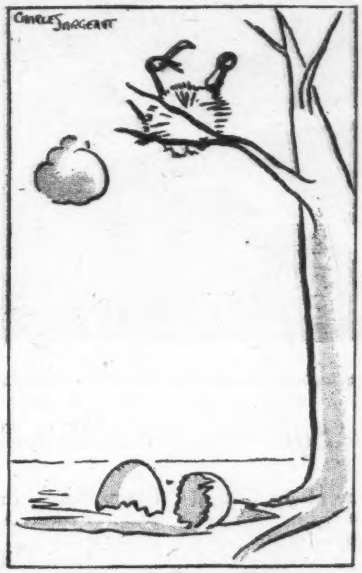
ULTRA-LIGHT aircraft enthusiasts will be interested to learn that Mr. F. N. Slingsby, of Slingsby Sailplanes, Ltd., has entered the field of ultra-lights with the design of a tractor motor-glider type based on his well-known Tutor glider. It is fitted with a 25 h.p. tractor engine and is a high-wing parasol monoplane of simple wood and fabric construction. The aircraft utilizes many parts (such as wing, rear fuselage and tail unit) of the glider which is already in quantity production. Should the demand prove sufficient, kits of parts or main components for engine installation and covering, may be offered for sale. The prototype is expected to fly in July.

New Line to Heathrow?

IT has been reported that the Ministry of Town and Country Planning has informed Twickenham Corporation that it is proposed to construct a new railway line to London Airport. The new line, it is stated, will join the existing Southern Railway line about 300 yards west of Feltham Junction. The project, however, appears to be in very early stages. When questioned by a *Flight* representative, neither the Ministry of Town and Country Planning nor the Ministry of Transport would divulge further information.

Skymaster Checks

AN order which caused a mild upset in U.S. Army Air Transport Command recently was the grounding throughout the world of the command's Skymaster fleet, in order to carry out "safety-checks" on all Skymasters' tail units. It was said that inspection had found stabilizer bolts and attached fittings "loose and sheared," a condition never before encountered in the command's fleet. However, the Skymasters were flying again within two days of the grounding order.



You realize this means building a completely new prototype?

HELPING TO GET THINGS RIGHT: Following a recent appeal by Staffordshire General Infirmary for up-to-date periodicals, Mr. D. J. Barr, a patient, chooses *Flight* for his reading.

"*Flight*" photograph

PRESENTATION: W/C. R. C. Keary, of No. 65 London Reserve Group A.T.C., presenting Cpl. Dalston, of No. 144 Gliding School, with his Royal Aero Club "A" gliding licence. (Left to right, facing camera), S/L. J. C. Parker, and W/C. R. C. Keary.

R.A.F. Film Magazine

A NEW film magazine produced exclusively for the Royal Air Force and published by the R.A.F. Cinema Corporation, is called *Ad Astra*. It is sold on R.A.F. stations in all parts of the world and the price is 3d. The R.A.F. Cinema Corporation, financially self-supporting, was formed a year ago to supply films to R.A.F. stations.

News in Brief

THIRTY-TWO children from Colmers Farm School, Rubery, were recently given half-hour flights from Birmingham Airport as part of a scheme to make schoolchildren airminded.

* * *

Employees of the Victorian and Interstate Airways of Australia have clubbed together to buy 100 food parcels for distribution to the workers of their associate company (Percival Aircraft, Ltd.) in England.

* * *

The London sales depot of the Chloride Electrical Storage Company, Ltd., evacuated to Richmond during the war, is now established at Whitfield House, 6-10, Whitfield Street, Tottenham Court Road, London, W.1. 'Phone: Museum 1616.

* * *

Messrs. Henry Wiggin and Co., Ltd., manufacturers of the high-temperature alloys known as Nimonic, have announced substantial price reductions in certain forms of these materials.

* * *

Geoffrey Dorman, who for the past year has been in charge of the Information Bureau of the Royal Aero Club, has now joined Airco, Ltd., W/C. Rex Stocken's firm, which undertakes, among other things, the organization of flying meetings.

B-29s OVER BRITAIN

Two of the nine Superfortresses over Plymouth at mid-day on June 11th.

Superfortresses of 340th Squadron, U.S.A.A.F., Range Far and Wide

MARHAM airfield, in Norfolk, home of the Central Bomber Establishment, received in fitting style last Monday the nine B-29 Superfortresses of the 340th Squadron, 97th Bombardment Group, U.S.A.A.F., which have been visiting the British Isles on a goodwill and training flight.

Fighting the gusts to keep formation, the big Boeings roared in low from the east, swept over the dais where Lord Tedder waited to welcome the crews, and made a wide circuit before re-crossing for a spectacular peel-off. Their timing was a model of accuracy, and having touched down at 30-40-second intervals, their squat black and silver shapes, tightly spaced, were soon rolling towards the saluting base. Here the leader stopped short and the other machines took position in the dispersal bays behind him, as though the whole event had been thoroughly rehearsed.

Salute

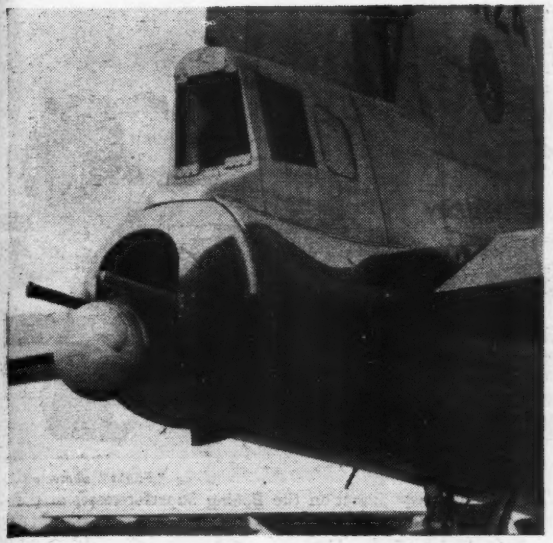
Without fuss the crews completed their parking routine and formed up before Lord Tedder, Chief of the Air Staff, who was accompanied on the platform by Major-General Clayton L. Bissell (U.S. Military and Military Air Attaché), Air Marshal Sir Hugh Saunders (C.-in-C. Bomber Command), and A.Cdre. Spencer (Commandant, Central Bomber Establishment). A bespectacled figure, Lt. Col. Sommers, officer commanding the American squadron, brought his men smartly to the salute, and the R.A.F. band broke into the Star-Spangled Banner and the National Anthem.

A warm personal greeting was extended by the C.A.S. to Col. Sommers and his squadron. He recalled how thankful he had been for the support of the 97th Bombardment Group during the Mediterranean campaign, and, in the name of the R.A.F., extended the hand of friendship and comradeship.

The B-29s had left Andrews Field, Maryland, on June 3rd and had crossed to Giebelstadt, Germany, by way of

"Flight" photograph.

The Chief of the Air Staff, Lord Tedder, and Major-General Clayton L. Bissell (centre) soon made Colonel Sommers feel at home.



"*Flight*" photograph.

The spherical housing of the radar tail warning device now applied to the rear gun position of the B-29.

the Azores. Thence they had flown to Marham, which was their base until they returned to the U.S.A. on June 16th.

The 340th Squadron belongs to the 97th Bombardment Group (the symbols "V.H.B." in the full designation of this Group denote "very heavy bomber") based at Smoky Hill, Salina, Kansas, and is a unit of the 15th Air Force, which has its headquarters at Colorado Springs. The "15th" is one of two air forces of the Strategic Air Command, the second being the 8th Air Force at Fort Worth, Texas. Commanded by General G. C. Kenney, the H.Q. of the Strategic Air Command are at Andrews Field, which it shares with the 4th Fighter Group, equipped with P-80 Shooting Stars.

As laid down by General Carl Spaatz, the roles of the Command are as follows: To conduct long-range operations in any part of the world, at any time; to conduct long-range reconnaissance over land or sea; to provide combat units capable of intense and sustained combat operations in all parts of the world; to perform sea search and anti-submarine operations on a global scale; to train units and personnel for the maintenance of Strategic Air Command forces in all parts of the world; and to perform such special missions as the Commanding General of the Army Air Forces directs.

At present equipped with B-29 Superfortresses, it is expected that before long the Command will receive the new B-50s and B-36s. The B-50 is a re-engined development of the B-29 with an appreciably higher performance, and the B-36, of course, is the new six-engined Consolidated—the largest bomber in the world.

War Record

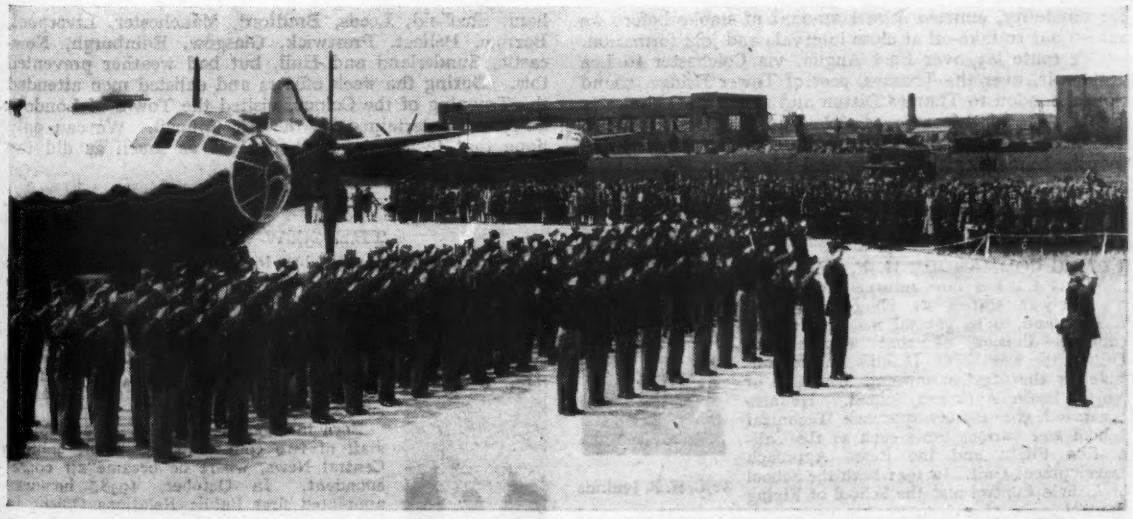
The splendid history of the 97th Bombardment Group, to which the C.A.S. referred, includes a number of "firsts" of which the Group is particularly proud. For example, aircraft of the Group made the first high-altitude daylight bombing raid in Europe, the first attack by heavy bombers from North-West Africa, and the first raid on Germany from an African base. The Group also took part in the "shuttle" raids, landing at Russian bases, and was the first to attack Berlin from the south.

Of the personnel making the flight to Britain some were old hands, like the "Deputy Squadron Leader," Lt. Col. Paul K. Blair, who served as Group Operations Officer in the Mediterranean for nine months and holds the Distinguished Flying Cross and Air Medal with Oak Leaf Cluster; but many had had no operational experience.

Of the aircraft themselves a great deal is already known to readers of *Flight*, but a few points deserve mention here. All nine of the visiting machines were equipped with a radar "wing," associated with the latest U.S. blind bombing device, and mounted on two stout supports under the fuselage between the bomb bays. Thus it would be impossible to carry a single Tallboy with this device fitted. In the air the fitting gives the impression that the aircraft might be carrying a supersonic Bell XS-1. Another innovation noted was the radar tail-warning device, mounted externally below the 0.5 in guns.

All aircraft were fitted with the latest type of forward upper barbette with four half-inch guns. This, and, in fact, all the fuselage barbettes, are remotely controlled from sighting stations, employing an automatic computor. Six electric motors are necessary to operate each barbette and the computor allows for wind velocity, gravity, lead, relative speed and parallax.

Most of the aircraft were painted anti-searchlight black



"*Flight*" photograph.

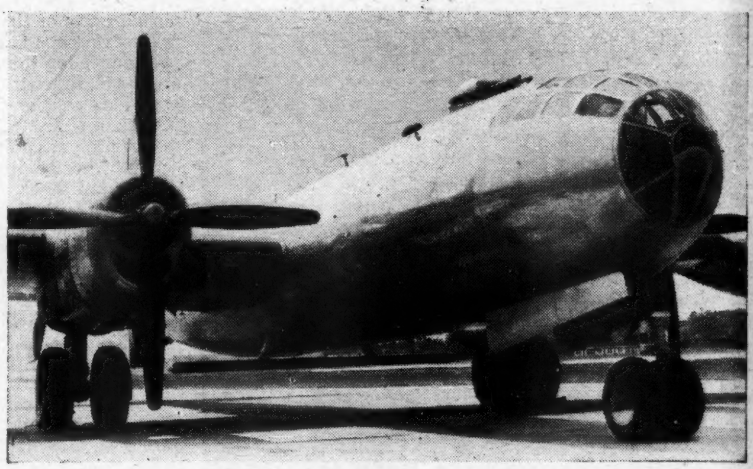
Having parked their aircraft the crews—numbering over 150—parade at the saluting base before Lord Tedder and Major-General Clayton L. Bissell.

B-29s OVER BRITAIN

on their lower surfaces, and carried a variety of colourful markings. On the whole, however, it could not be said that they looked as smart as the 35 Squadron Lancasters which visited America last year.

The night preceding the flight over London and Southern England we spent at the R.A.F. Station Feltwell, where G/C. Jonas is handing over to G/C. Broughton. As G/C. Jonas is to be the new Air Attaché in Washington he found plenty to discuss with Col. Sommers when the Colonel called in during the evening.

For the flight on June 11th we were assigned (to use appropriate terminology) to the lead ship—BF-100—carrying Col. Sommers and captained by Lt. Fall. The passenger list included an AC2 who had never flown before, and G/C Bufton, of the Central Bomber Establishment, who remarked favourably on the layout of the aircraft.



"*Flight*" photograph.

The "radar wing", now standard equipment on the Boeing Superfortresses of the 97th Bombardment Group.

Wearing back-type parachutes, we positioned ourselves after take-off in the upper sighting station which, though it restricted our downward vision and prevented our seeing many of the towns over which we passed, had the virtue of providing an excellent view of the variety of R.A.F. aircraft which flew around, or with, us at various points. A certain degree of downward view is, in fact, possible from this position, through the lateral sighting stations, but these—to the chagrin of the photographers—were obstructed to a large extent by fire control gear.

Running forward from the rear pressurized compartment, with which the upper sighting station is integral, is a long padded tube, through which access may be had to the forward pressure cabin by anyone with elementary commando training. Below this crawlway is the bomb bay, entered through a circular pressure-sealed door. The occupants of the rear compartment have a jettison switch which opens the bomb doors and releases the bombs or long-range tank, permitting emergency escape. This would otherwise be difficult.

The Wright Cyclone 18 R-3350 turbo-supercharged radials, which seem smooth and have a great reputation for reliability, emitted a vast amount of smoke before we taxied out to take-off at close intervals and join formation.

Our route lay over East Anglia, via Colchester to Lea Reservoir, over the Thames, east of Tower Bridge, round South London to Thames Ditton and along the Thames to Erith. The south coast was picked up near Beachy Head, and the holiday crowds at Brighton, Portsmouth, Bournemouth, Lyme Regis, Torquay and Plymouth should have had a good view of the formation. In Southern Wales we passed over Swansea and Cardiff, and returned home by way of Bristol and Cambridge. There was a slight deviation from our published route when we crossed Stradishall airfield, the home of No. 35 Squadron, some members of which, who had visited the U.S.A., were acting as guides to the American aircrews during their stay.

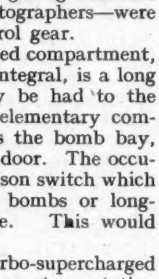
Our own aircraft, we later discovered, was being flown manually, without the aid of the Minneapolis-Honeywell automatic pilot. Contrary to common belief, the controls of the Superfortress are not power-assisted. On the whole the formation appeared to be good, considering the size and weight of the aircraft, but there was a certain amount of straggling at some points.

During the early part of the flight a Proctor, an Anson and an Oxford did their best to come alongside, a Firefly zoomed past, a Sea Fury with wing tanks literally made rings round us, a blue Spitfire rolled ahead, assorted Mosquitoes easily kept station, and a Buckmaster called in to pay its respects. Thereafter a Meteor and a Lancaster came up for a look-see and near home a York actually joined the formation. Over Marham we felt appreciable "g" as we peeled-off to land, after a wholly pleasant flight.

On June 14th, the squadron was to have visited Birmingham, Sheffield, Leeds, Bradford, Manchester, Liverpool, Barrow, Belfast, Prestwick, Glasgow, Edinburgh, Newcastle, Sunderland and Hull, but bad weather prevented this. During the week officers and enlisted men attended the Trooping of the Colour, visited the Tower of London, and were entertained by the Air Council. We can only hope that they enjoyed themselves as much as did the crews of 35 Squadron in America.

BACK AT HAMBLE

WING COMMANDER H. F. JENKINS, A.F.C., has now returned to resume his pre-war duties as chief instructor, A.S.T., and to be general manager of the training division of that organization. During the war W/C. Jenkins was responsible for the organization and formation of No. 1 Beam Approach School. He also organized the Beam Approach Technical School and various units such as the Calibration Flight and the Beam Approach Development Unit. In 1941 both the School of Airfield Control and the School of Flying Control were placed under his command. W/C. Jenkins thus brings a wealth of experience to his resumed work with Air Service Training, Ltd., which still operates from Hamble, Hants.



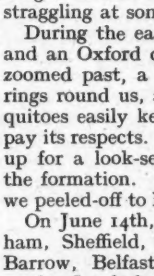
W/C. H. F. Jenkins

THE NEW D.D.P.R

THE aeronautical press has learned with satisfaction that Mr. Thomas Cochrane has been appointed to succeed the late C. P. Robertson as Deputy-Director of Public Relations at the Air Ministry.

"Tommy" Cochrane has ever been ready to go out of his way to assist journalists in getting news of the R.A.F., and with his tact and talent he should prove a worthy successor to his late chief.

Born in 1909, he served on the editorial staff of two county papers before joining Central News, where he became air correspondent. In October, 1938, he was appointed first Public Relations Officer in the R.A.F., and in September, 1939, joined the Air Affairs Section of the Ministry of Information. Two years later he became head of the Press Section at the Air Ministry.



Mr. T. Cochrane

American Newsletter

New Jet-propelled Fighters and Medium-Heavy Bombers : Reactions to Constellation Decision

By "KIBITZER"

ON various occasions I have mentioned the developments of new American types, both those intended for production and those designed for purely experimental work. Of those that are due to appear in the near future enough has now been rumoured or published for a clearer picture to be obtained of at least three phases of such development. In order of aircraft size these new machines are: the piloted sonic or supersonic experimental types; the new Army and Navy interim fighters (interim, that is, between the existing fighters and the supersonic ones); and the medium-heavy jet bombers.

Bell leads off the experimental sonic class with the XS-1 and the XS-2, details of which have already been given. Following them are the XS-3 to be built by Douglas, in California, and the XS-4 by Northrop. The Navy Douglas-built D-558-I and D-558-II round out the picture as it is known at the moment. The XS-1 and the D-558-I have straight wings, but all the others have swept-back wings of one type or another. Most of them are said to be powered by TG-180 jet engines. Personally I should think that this engine is merely listed as the power unit because the newer and more powerful engines now under development are not yet ready and have not been released from the secret list. The TG-180 is so obviously of too low a thrust to give the speeds expected that it is hardly likely to be used on the final sonic flights. The full list, so far published, is as follows:

Machine	Builder	Wing plan	Engine	Status
XS-1 ..	Bell ..	Straight ..	Rocket ..	Has flown
XS-2 ..	Bell ..	Swept-back	Rocket ..	To fly
XS-3 ..	Douglas	Diamond..	Jet ..	To fly
XS-4 ..	Northrop	(Tailless) triangular	2 TG-180s	To fly
D-558-I	Douglas	Straight ..	TG-180	To fly soon
D-558-II	Douglas	Swept-back	TG-180 ..	To fly

The final answer to any intercepter fighter programme must obviously depend on the progress that is made in the field of supersonics, and it appears that there is still so much work to do in this regard that the next step can only be the production of fast—but not even sonic—machines. Presumably powered by new types of jet engine, such aircraft may be capable of utilizing rocket boost to carry them through to high Mach numbers if their characteristics permit it.

In order of their development number, North American are building the swept-back wing XP-86, while Northrop have the XP-89, which, it may be safely assumed, will be a development of the wartime tailless types. Lockheeds have—besides a new mark number of the P.80—the XP-90, and Republic the XP-91. Consolidated have the XP-92. The specification for this series probably calls for about 700 m.p.h. without rocket assistance, as well as a very high rate of climb. Armament may well be limited to two or four cannon in the nose. The job of combining such high performance as is visualized with adequate range and endurance is a considerable engineering feat, and the next two years of development in this field will be tremendously interesting.

The Navy, too, has its own jet programme, which may be less spectacular in the way of high speeds, but if it follows the usual U.S. Navy practice it will be along sound and steadily progressive lines. They are developing a heavier, faster, and slightly altered version of the McDonnell Phantom, known as the Banshee, which is in the 600 m.p.h. class. Grummans are building three F.9.F. fighters, two of which will have British-built "Nenes," and the other an Allison jet. Apparently the Navy, who has been keenly interested in the Rolls "Nene"—as opposed to the Derwent—is now quite satisfied with this engine. This is borne out by the pressure on Pratt and Whitney to purchase the licence for such engines and build them at Hartford. This will mean that one more British design of jet will be made over here; it will probably lose its identity in the subsequent advertising and nomenclature.

Allisons are said to be the main future source of supply for the Army and have taken over the development of the J-33 (I-40) and possibly also the J-35 (TG-180). The former of these two power units has now completed its 150-hour type test and is also claimed to be giving up to 200 hours between overhauls in actual service. If this latter fact is correct, it means a great improvement over its reliability record of 1946!

500 M.P.H. Bombers

In the medium-heavy bomber programme there are two specifications: the four-engine jet and the six-engine. Only one of these, the Boeing, is said to embody any radically new developments in design. The others are fairly straightforward, thin-wing, well-streamlined machines. They are the North American XB-45, a four-jet aircraft with two engines in each wing nacelle, and the Consolidated XB-46 of similar specification. Both have flown and are expected to have speeds round about the 500 m.p.h. mark. Their weight is much greater than was expected, the published figures for the XB-46 giving it an all-up weight of 91,000 lb, and a useful load of 43,000 lb.

The XB-47 built by Boeing and the Glenn Martin XB-48 each have six jets, the latter having three in each wing nacelle. The design of the Boeing, however, is said to call for two engines in each wing nacelle and another on the tip of each of its swept-back wings. Its weight is as yet unknown, but the Glenn Martin is over 100,000 lb. This latter machine is now doing preliminary taxying trials on its tandem-wheel undercarriage, first tested out on a B-26 at the end of the war and found to be very satisfactory. It is an idea that certainly overcomes the great difficulty of tucking low-pressure tyres away into the modern high-speed wing, the lateral ground stability being taken care of by two small wheels which are housed in the engine nacelles.

Early Obsolescence

It will be most interesting to see what will be the outcome of all these programmes. At best both the 700 m.p.h. fighter and the 100,000-lb jet bomber can be interim projects only, the former because of its limited usefulness in the subsonic speed bracket, and the latter because of its limited range and speed with the present jet engines. The discomforting thought about all this is that in 1941 such performances would have been considered a Wellsian dream, and few of us thought that we should see them in 1948. Yet now we consider such machines as out of date, and perhaps useless for a modern war. This being the case, where do we go from here? I, for one, find the whole outlook very disquieting and, as with so many other branches of modern science, of doubtful value to civilization unless controlled by a collective wisdom which civi-

AMERICAN NEWSLETTER

lization itself does not appear to possess—or even desire.

The news that, after all, B.O.A.C. would not be buying any more Constellations, whatever their engines, was received with mixed feelings here. Quite naturally, the American aircraft manufacturer was disappointed, for a strong talking point in his international sales patter was silenced. But some of the American international airlines were probably glad. The very excellent job now being done by B.O.A.C. on the North Atlantic with such "Connies" as they have has shown what a serious rival they can be on any route where they are on even terms with their competitors in the way of equipment. For sheer efficiency, both in maintenance and passenger handling they are hard to beat, and with Constellations on the Empire routes the fight would have been a stiff one. As it is, the scrap for the traffic will tend to be between the U.S. lines or such Dominions as operate more modern and efficient aircraft than those which B.O.A.C. will use.

Enterprise in Danger

Sir Roy Fedden's Organization Threatened with Closure: Promising Projects to be Scrapped?

THE research and development organization known as Roy Fedden, Ltd., has suffered the great misfortune of having its contracts both for the Fedden airscrew turbine and the flat-six reciprocating engine terminated almost simultaneously. The double blow has fallen quite fortuitously in that the termination of the gas turbine development contract was purely an affair of the Government, whereas the closure of the flat-six development was due to the recession of the American Erco concern, for whom the engines were being primarily developed. Although these items are thus unrelated, in fact they have a common origin, financial stringency.

After its formation as a company in the spring of 1945, Roy Fedden, Ltd., was awarded a design contract by the Ministry of Aircraft Production for a design study of an airscrew turbine based upon certain design conclusions which had been submitted to the Ministry. The contract, intended to be the forerunner of others and covering the building and development of a batch of prototype power plants, was tentatively approved in August, 1945, pending agreement of a financial arrangement. Subsequently, Power Jets, Ltd., agreed to act as a consultative body, whilst the Ministry of Labour agreed to give full assistance in providing the necessary design staff.

A separate department of the company was formed, and design work was started in July, 1945. By the end of that year a specific design was submitted to the Ministry. Several discussions were held with the Director of Engine Research and Development during November and December, 1945, and in January, 1946, when the fundamentals of the design were agreed upon. Following this, the company received a contract to supply six airscrew turbines in order to develop the type up to production standard.

The present contract covered the design, construction and supply of six 1,350 h.p. airscrew turbine engines, inclusive of a complete series of tests of components, the supply of an installation mock-up, and bench and hangar tests of the complete engine to A.R.B. civil type requirements.

In January, 1946, the programme of design and development was laid down, a factory was acquired and the machine tools and test equipment placed on order. The programme was as follows:—

Combustion testing started	March, 1947
Test compressor due	July, 1947
Test reduction gear due	October, 1947
Turbine assembly for calibration due	December, 1947
Research engine (F.R. 1) due ..	October, 1947
First prototype "Cotswold" due ..	November, 1947
Two "Cotswolds" for flight test due	July, 1948
Type testing expected to start ..	January, 1948

The company was fortunate in its search for men already qualified by experience to undertake the design and development of the airscrew turbine. The team which is headed by Sir Roy Fedden forms a small, well-knit and immensely enthusiastic band whose technical quality is not rendered less valuable by their lack of preconceived inhibitions in their work.

When Roy Fedden joined the Bristol Aeroplane Company in 1920, and that concern decided to interest itself in building aircraft engines, it was asked why should another engine manufacturer be required when there were already three large concerns building aircraft engines in the country. Bristol engines supply as effective an answer to that question as could be wished.

Whether the extremely critical financial situation which faces this country at the present time is a really adequate excuse for disrupting Roy Fedden, Ltd., is something which is extremely difficult to evaluate. Without in any way minimizing the seriousness of the country's financial stringency, it may be queried whether so unfortunate a step as this is not being penny wise and pound foolish, more particularly in the light of depriving this country of a valuable research and development team at a time when we can least afford to lose it.

Helping to Keep the Lead

It might also be asked whether, in view of the development of other airscrew turbines of similar class, progress with the Fedden "Cotswold" is financially tenable. On this count we are inclined to the view that the advantages in weight, cost and performance to be expected from the "Cotswold" cannot lightly be thrown to the discard. In any event, although gas turbines are still in their infancy, this country does hold the premier position in the international field, and to detract from that position by disregarding advances such as those offered in the "Cotswold" would seem to be doubtful policy.

The factory at Stoke Orchard, near Cheltenham, into which the company moved in June last year, has been planned to provide the nucleus of a modern development organization. The machine shop covers an area of approximately 8,000 sq ft and is equipped with the most modern machine tools suitable for high-class precision experimental work. In addition to the existing units, three main buildings (which are at present partially constructed) were intended to provide (i) a component test house to accommodate all the plant acquired for component research and development, viz.: combustion rig; reduction-gear test rig; overspeed rig; fuel-system rig; bearing test rig; vibration and fatigue equipment. (ii) A dynamometer test house sound-proofed and intended to accommodate a 3,000 h.p. electric dynamometer. (iii) An airscrew hangar which, also sound-proofed, would contain a cable-type hangar.

In addition to these new structures, the factory has been equipped with a new heat treatment department, a metallurgical laboratory and a standards room, most of which have now been finished. The progress made in creating this organization in face of all the difficulties raised by the Ministry of Town and Country Planning, and as a result of licence and priority procedure, is a fine achievement. It is not something which should be forced out of existence without a very careful weighing-up of facts.

LONDON AIRPORT

Twenty thousand passengers passed through London Airport last month—an average of about 650 a day. This traffic was handled by the scheduled air lines and leading charter companies of a dozen different countries. B.O.A.C. and B.S.A.A. flew 205 aircraft in and 179 aircraft out of the airport, carrying a total of nearly 4,500 passengers.

Good progress is being made towards the completion of the runways as may be seen from this recent photograph taken by the Air Survey Co., Ltd.

HEATHROW was selected as the site for a major air terminal to serve London after a survey had been made of fifty-one other possibilities. During the later stages of the war, the construction of runways at Heathrow was started for an airfield to be used by R.A.F. Transport Command. The Ministry of Civil Aviation ultimately undertook the responsibility of design and construction, and on January 1st, 1946, Lord Winster christened the site "London Airport." It was first opened for international use as a civil airport on May 31st, 1946. On this and following pages are photographs of the airport as it is today.

The first triangle of runways has been completed and there are now in use Number 1 runway 3,000 yards' long, and two others, later to be extended, 2,000 yards in length. Number 4 is complete, and Number 5 has been started.

In addition to the schedule and charter passenger services operating through the airport, the large cargo-carrying charter companies and special scheduled freighters carry about 150 tons of freight in and out each month.

Sir John D'Albiac was appointed Commandant of the Airport last February. Mr. Roger Pugh, the Airport Manager, is responsible for the M.C.A. administration, with a staff of about 400. There are also some 1,500 other persons employed by the Airport.

(Top) *Pre-flight briefing for a B.O.A.C. crew. Tropical uniforms would suggest that they are eastward bound.*

(Above) *Flying control officers at Heathrow have this view of the aircraft on the tarmac from their east-facing window. Airfield lighting is controlled from the panel.*

(Right) *London Airport is said to have the best flying control and navigational aids of any terminal in the world. With his Airfield Control Radar this operator can see the movements of any aircraft flying within approach radius of the airfield.*

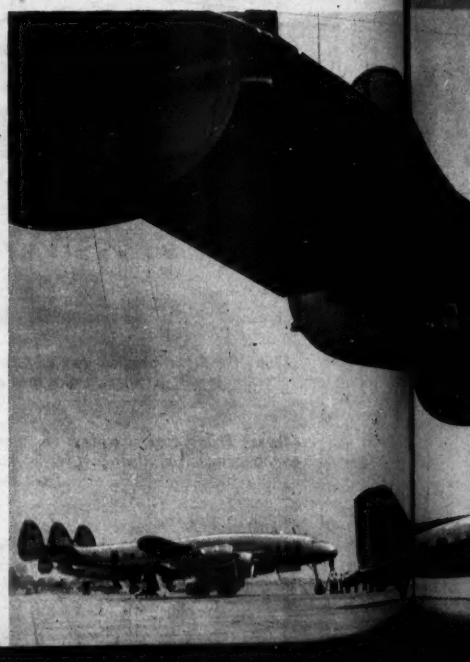
LONDON AIRPORT

Arrival from the East. One of B.O.A.C.'s Yorks.

The York, Murchison, discharges mail and passengers' luggage.

(Right) An American Overseas Airlines' Constellation overshadows the Heathrow control building.

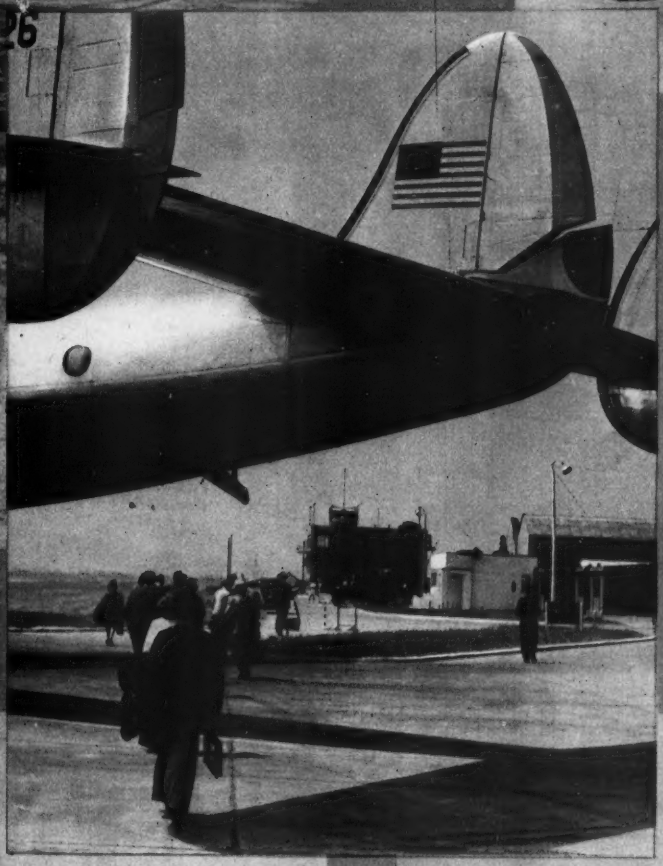
(Below) Air France's DC-3s on the Continental routes share the tarmac with long-range visitors from America.

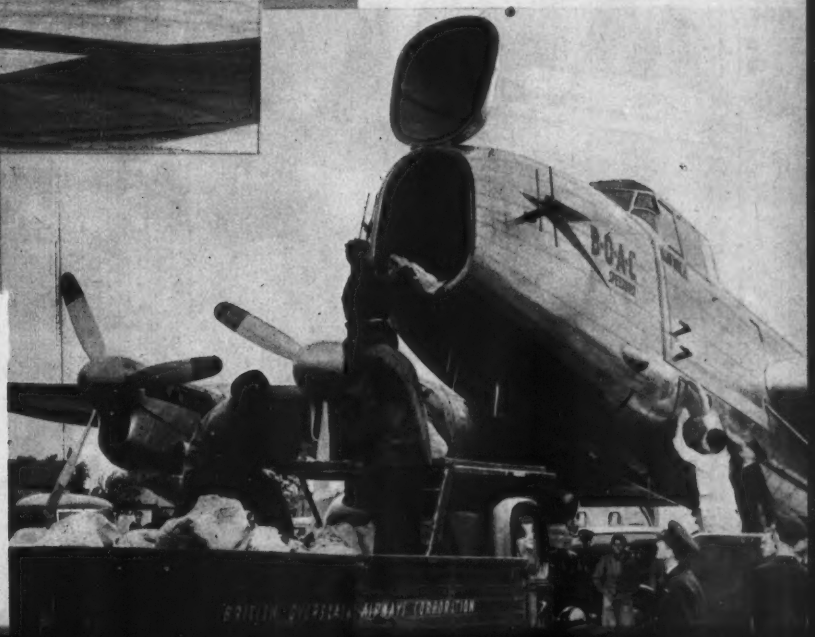


"Flight" Photographs

(Above and below) All aboard for New York with Pan American World Airways and American Overseas Airlines.

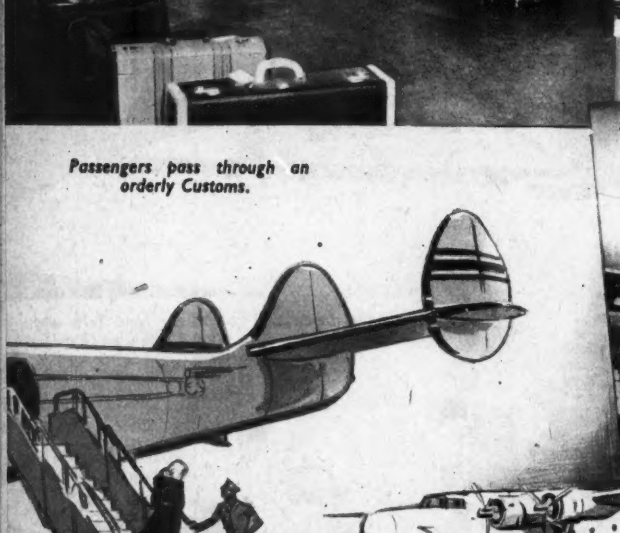
(Below) Mail for India in a B.O.A.C. Lancastrian. The doctor in a white coat is fumigating a freight compartment.





LONDON AIRPORT

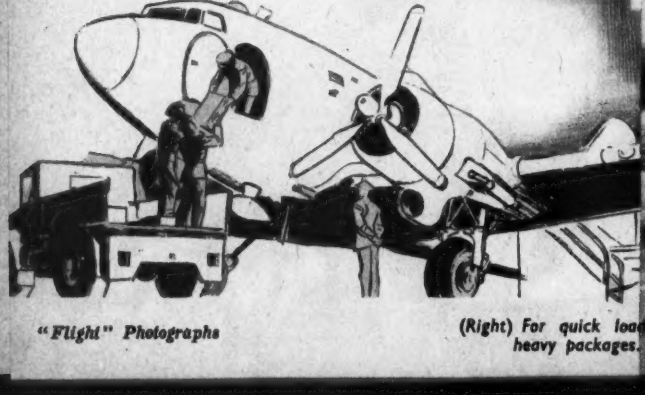
Passengers pass through an orderly Customs.



Sabena's DC-3s now operate from London Airport.

Enquiries are dealt with here.

Passengers from New York disembark.



"Flight" Photographs

(Right) For quick loading of heavy packages.

Aircraft Power Plants

Authoritative Lectures Before the Institution of Mechanical Engineers

IN connection with the Centenary Celebrations of the Institution of Mechanical Engineers, Tuesday, June 10th, was largely devoted to consideration of aircraft power plants. Papers presented on that day emphasized the different lines of past and present development in this country and the U.S.A. and also revealed a divergence of opinion regarding the future.

In the Paper "**Piston Aero Engines**" the introductory remark "So far as military aviation is concerned, it is likely to be the swan song of the piston engine" gained an added significance coming from the author, Mr. H. R. Ricardo, B.A., LL.D., M.I.Mech.E. Our policy in developing small, high-pressure, high-speed engines had been vindicated during the Battle of Britain. By employing mean effective pressures of the order of 350-400 lb/sq in in the case of liquid-cooled units our engines had a swept volume and a frontal area only about 70 per cent of those of others of the same type and power. An increase in the octane rating of fuel from 66 to 100 had permitted almost a threefold increase in mean effective pressure at the cost of more than doubling both the maximum gas pressure and the intensity of heat flow.

Many component improvements contributed to the development. Sodium-cooled valves, stellite valve facings and seatings, copper-lead and cadmium-nickel bearings and, so far as the piston is concerned, the Napier wedge-shaped ring. This is credited with raising the limiting operational temperature by some 50 deg. C.

Sleeve Valves

Twenty-five years ago it was realized that the sleeve valve would permit higher output within the limits set by the incidence of detonation and was relatively immune from the effects of leaded fuels. Alone amongst the belligerents we adopted the sleeve valve for air- and liquid-cooled engines, exemplified by Bristol, Napier and Rolls-Royce units.

As far back as 1921 the Royal Aircraft Establishment had converted a single-cylinder aero-engine unit to compression ignition and achieved a power output closely comparable to contemporary petrol engines but with a fuel consumption as low or lower than large stationary or marine diesel engines. By 1928 several full-sized experimental engines were built but before they were fully developed petrol had so much improved that the advantage had disappeared. During the later 1930s the petrol engine gained such a lead that the compression ignition engine could not reasonably compete.

The work was not wasted, however, as it served to improve mechanical design and develop the technique of fuel injection. Petrol injection to individual cylinders confers equable distribution of fuel and, almost as important, accurate apportionment of lead. Further, by wide valve overlap it becomes possible to scavenge the cylinders and thus obtain an increase in power output of the order of 10 per cent. Against these advantages must be offset the fact that admission to and evaporation of the fuel in the supercharger greatly improves its performance. This is very important in British practice where high supercharge ratios are employed.

The author did not favour the design of special types for civil aviation but rather the modification of fully developed military units. The compression-ignition engine may be worth development for the smaller classes of civil aircraft and especially for the quite small privately owned plane. Another possible development for long-range aircraft was the compounded plant in which a small, high-pressure, valveless two-stroke engine is used, in effect, as a combustion chamber for a turbine. By such means it should be possible to attain an overall efficiency substantially higher than either the piston engine or the turbine alone.

According to Prof. W. J. King and W. R. Hawthorne, D.Sc., in their Paper "**American Aircraft Propulsion Machinery,**" interest in the piston engine has somewhat revived and "early enthusiasm for turbo-jets and turbo-props has been dampened by development difficulties and the realization that fully satisfactory engines are years rather than months away."

Descriptions were given of the 28-cylinder 2,800 h.p. Pratt and Whitney R-4360 (Wasp Major) and the 18-cylinder 2,100 h.p. Wright R-3350 air-cooled radial engines which are expected to hold their position against turbine competition for some years. Amongst liquid-cooled engines, the 12-cylinder 1,360 h.p. Allison is being fitted to a small number of Twin Mustang fighters while the 16-cylinder 2,150 h.p. Chrysler appears quite dormant.

Three full-sized Lycoming XR-7755 engines, however, are undergoing test and development. This is a 36-cylinder four-row, liquid-cooled radial having a piston displacement of 7,755 cu in and rated at 5,000 h.p. for take-off and 4,000 h.p. for continuous operation. Each of its nine banks of cylinders has a camshaft with two sets of cams and can be shifted to change the valve timing for maximum power or economical cruising. The airscrew drive is through a two-speed, dual-rotation, reduction gear, selectively employed at the pilot's discretion to obtain maximum airscrew efficiency. These innovations aim to secure optimum fuel economy at cruising power without compromising high-power output. Overall dimensions are 61in diameter and 121in long and the dry weight is 6,050 lb. It is hinted that, in some quarters, there is a feeling that such engines and the larger air-cooled radials "might again become critically important in the event of another emergency within the next few years."

Current trends indicate wider use of direct fuel injection, water-alcohol injection for take-off, exhaust efflux propulsion, and small turbo-superchargers to pressurize cabins as well as charge engines. There is no interest in diesel engines but some consideration of two-stroke petrol engines for light planes. The free-piston engine or "power-gas generator" supplying a turbine has lost support as the plants are regarded as too heavy and bulky.

Turning to turbines, G.E.C. and Westinghouse units are described and reference is made to new turbines being built by aircraft engine firms. Wright has an airscrew driving unit of 5,500 h.p. with two-stage centrifugal compressor and two-stage turbine while Northrop-Hendy has built a turbo-prop with an axial compressor and multi-stage turbine. Private and Government-sponsored research is being conducted on such problems as combustion, blade material, blade cooling by air and water, icing of jet engines, after burning, water-alcohol ingestion into the compressor, heat exchangers and variable-area jet nozzles. It is suggested that by 1957 jet units will develop 16,000 lb thrust on a fuel consumption of 0.8 lb/hr/lb and turbo-props 10,000 h.p. with a consumption of 0.45 lb/h.p./hr. Finally, it is noted that Fairchild has been granted a contract to develop means for applying atomic energy to propulsion. This, it is suggested, "may lead to even more spectacular new propulsion units in the not too distant future."

Weight and Nuclear Energy

In sharp contrast to the foregoing is the statement of Mr. J. D. Cockcroft, C.B.E., M.A., F.R.S., director of the Atomic Energy Research Establishment, in his lecture "**The Possibilities of Nuclear Energy for Heat and Power Production.**" His view is that "application of nuclear energy to mobile power units will be limited by the weight of shielding required to protect operators. This will be of the order of 100 tons for a unit developing a few thousand horsepower. Nuclear propulsion could therefore be envisaged only for planes weighing several hundred tons, and seems to be quite impossible for road vehicles. Ship propulsion would seem to offer a more favourable field."

In the foreseeable future, rockets and ram jets will be used only for experiments and military purposes, stated Mr. Hayne Constant, M.A., M.I.Mech.E., in his Paper "**Aeroplane Gas Turbines.**" During the decade in which the aircraft turbine has been under development progress has been less spectacular in the turbine than the compressor. Centrifugal types now have an efficiency of 78 per cent at 4:1 pressure ratio while axial units can attain 88 per cent up to a pressure ratio of 6:1. Little further improvement can be expected in combustion efficiency as the losses are only about 1.5 per cent due to incomplete combustion and 2.5 per cent pressure losses. Existing chambers, good for several hundred hours operation before inspection is necessary, are developing heat at a rate of 7,000 h.p. per cu ft, and chambers are available giving 10,000 h.p. per cu ft.

Aircraft problems remain to be solved before supersonic speed can be achieved, but we now know how to make engines that could provide the prodigious thrust necessary. For the smallest aircraft the power required to fly slightly above the speed of sound would be some 15,000 h.p.

Birthday Honours

Awards for Industry Executives and Designers : Many Service Officers Decorated

F. Montague, Esq., M.P., U.S. of S. for Air 1929-31 —Baron.

Major Hew Ross Kilner, Vickers-Armstrongs Ltd. —Knighthood.

C. C. Walker, Esq., de Havilland Aircraft Co. Ltd. —C.B.E.

BARON

Frederick Montague, M.P. for W. Islington, 1923-31, and since 1935. Parliamentary Under-Secretary of State for Air; 1929-31, Parliamentary Secretary, Ministry of Transport, 1940-41, and Ministry of Aircraft Production, 1941-42—for political and public services.

KNIGHTS BACHELOR

Maj. Hew Ross Kilner, Dep. Chairman and Managing Director (Aviation), Vickers-Armstrongs, Ltd.; Andrew McCance, F.R.S., member, Advisory Council to Committee of Privy Council for Scientific and Industrial Research; Archibald Hector McIndoe, civilian consultant in plastic surgery to R.A.F.

ORDER OF THE BATH

ROYAL AIR FORCE

K.C.B. (Military Division)

Air Marshals C. B. Cooke, R.A.F.; R. V. Goddard, R.A.F.

C.B. (Military Division)

Air Vice-Marshals A. L. Paxton, R.A.F.; T. A. Warne-Browne, R.A.F.; A. L. A. Perry-Keene, R.A.F. Air Commodores F. Beaumont, R.A.F.; R. B. Jordan, R.A.F.; J. G. W. Weston, R.A.F. Grp. Capt. E. N. Lowe, R.A.F.

K.C.B. (Civil Division)

Sir (Albert) Henry Self, Perm. Sec., Ministry of Civil Aviation.

ROYAL VICTORIAN ORDER

C.V.O.

Wing Commander P. W. Townsend, R.A.F.

M.V.O. (Fourth Class)

Wing Commander E. W. Tacon, R.A.F.

M.V.O. (Fifth Class)

Squadron Leaders H. F. Payne, R.A.F.; H. Wright, R.A.F.V.R. Flight Lieutenants A. Knapper, R.A.F.; G. A. Pearson, R.A.F.; L. G. A. Reed, R.A.F.

ORDER OF THE INDIAN EMPIRE

C.I.E.

Lieutenant Commander W. H. Watt, Deputy Director General of Civil Aviation, India.

ORDER OF THE BRITISH EMPIRE

ROYAL AIR FORCE

K.B.E. (Military Division)

Air Vice-Marshal W. B. Cushion, R.A.F. (Rtd.).

C.B.E. (Military Division)

Air Commodore A. D. Davies, R.A.F., Group Captains J. M. Cohu, R.A.F.; F. A. Norton, R.A.F.; G. C. Stemp, R.A.F.; H. E. Cardwell, R.A.F.; T. G. G. Hutchinson, R.A.F.

O.B.E. (Military Division)

Group Captains D. D. Christie, R.A.F.; W. D. Blackwood, R.A.F.; W. I. G. Kerby, R.A.F. Wing Commanders F. E. Burton, R. or A.F.O.; C. F. Goatcher, R.A.F.; W. L. Houlbrook, R.A.F.; H F. Jenkins, R.A.F.; J. D. Melvin, R.A.F.; K. Slater, R.A.F.; J. H. Page, R.A.F.V.R. Squadron Leaders H. E. Barker, R.A.F.; J. H. Wortley, R.A.F.V.R. Group Officer Pamela C. Greig, W.A.A.F.

Civilian Awards

D.B.E.

Miss Caroline Haslett, for services to the Bd. of Trade and Min. of Labour.

C.B.E. (Civil)

O. F. Brown, Asst. Sec., Dept. of Scientific and Industrial Research; A. T. Nichols, Asst. Sec., Air Ministry; C. C. Walker, Director and Chief Engineer, de Havilland Aircraft Co.

O.B.E.

Miss F. B. Bradfield, Prin. Scientific Off., Royal Aircraft Establishment, Farnborough; J. H. G. Calcutt, Supervising Lands Officer, Dir. of Works, Air Ministry; R. E. Hardingham, Prin. Surveyor, Air Registration Board; A. J. Quin-Harkin, I.A.T.A. Clearing House, London, for accounting services with Imperial Airways and B.O.A.C.; E. J. Hunt, Prin., Air Ministry; A. C. Knowling, Asst. Dir. of Telecommunications, Min. of Civil Aviation; A. G. Simons, Supt. Civil Eng., Grade I, Air Ministry; P. G. Tweedie, Dept. Chief Insp. of Accidents, Min. of Civil Aviation.

M.B.E.

D. A. Baird, Chief Designer, Nuffield Mechanizations, Ltd.; W. Bell, Superintendent of Signals, Africa and Middle East area; C. Crowfoot, Senior Experimental Officer, Royal Aircraft Establishment, Farnborough; Capt. V. W. Saltan, pilot, Tanganyika, B.O.A.C.

B.E.M.

A. Eaton, Principal Artificer, Dept. of Scientific and Industrial Research; A. E. Robinson, Assistant Line Engineer, B.O.A.C.

ROYAL AIR FORCE AWARDS

AIR FORCE CROSS
BAR TO A.F.C.

Group Captain E. M. Donaldson, R.A.F.; Lieutenant-Colonel P. M. Retief, S.A.A.F. Squadron Leader W. A. Waterton, R.A.F.O.

A.F.C.

Group Captain J. H. T. Simpson, R.A.F.; Wing Commanders E. Coton, R.A.F.; J. G. Mann, R.A.F.O.; R. Maycock, R.A.F. Squadron Leaders S. E. Bulford, R.A.F.; W. E. Farrow, R.A.F.; J. T. Freeman, R.A.F.; H. S. Grimsey, R.A.F.V.R.; L. Preddy, R.A.F.; J. Singleton, R.A.F.V.R.; Lieutenant-Commander E. Brown. Flight Lieutenants A. R. Ainsworth, R.A.F.V.R.; J. S. Aldridge, R.A.F.V.R.; R. A. Baker, R.A.F.V.R.; E. W. Bartlett, R.A.F.V.R.; S. Beckett, R.A.F.V.R.; N. Briggs, R.A.F.; A. Contaris, R.A.F.V.R.; D. J. M. Coxhead, R.A.F.V.R.; W. G. Drinkell, R.A.F.; W. K. Greer, R.A.F.V.R.; P. Harrison, R.A.F.V.R.; J. M. John, R.A.F.V.R.; P. C. Kilmister, R.A.F.V.R.; S. McCreith, R.A.F.V.R.; W. T. Morrison, R.A.F.; J. Murphy, R.A.F.V.R.; D. B. Nixon, R.A.F.; K. W. Pendrey, R.A.F.; F. H. Smith, R.A.F.V.R. Flying Officers H. T. Goldham, R.A.F.V.R.; J. Munro, R.A.F.V.R.

ROYAL AUSTRALIAN AIR FORCE

A.F.C.

Squadron Leaders J. R. French; C. C. Henry; J. G. Hoskins; J. R. Lavers; J. T. O'Brien. Flight Lieutenants R. W. Adsett; E. M. Allison; M. W. Baker; M. C. Clifford; C. R. Gallwey; E. T. W. Holt; P. J. Love; A. W. P. Malcolm; C. R. McNichol; J. Rankin; E. B. Stacy. Flying Officers A. Burns; H. A. Kirkhouse; N. J. Properjohn.

ANGLO-AMERICAN AERONAUTICAL CONFERENCE

ORGANIZED by the Royal Aeronautical Society and the Institution of Aeronautical Sciences, the Anglo-American Aeronautical Conference will be held from September 3rd to September 6th, 1947, at the Victoria Halls, Bloomsbury Square, W.C.1.

Papers will be prepared by the leading aeronautical authorities in this country and the United States, and, in all, twenty separate papers will be read. Generally there will be four papers in each morning session (two being read at the same time in different halls) and two or more in the afternoon. On the morning of the final day of the conference the general conclusions will be summarized and a discussion will take place on the technical trends of the next few years. A reception will be held for the conference delegates at the Society's headquarters, 4, Hamilton Place, W.1, on Tuesday, September 2nd, and a Garden Party to the delegates and their ladies will be given by the President at Limes House, Stanmore, on Sunday, September 7th. On Tuesday, September 9th, a dinner at which the Lord Mayor will be present will be held at the Guildhall. Membership of the conference will be limited in numbers and it is advisable to make application as soon as possible.

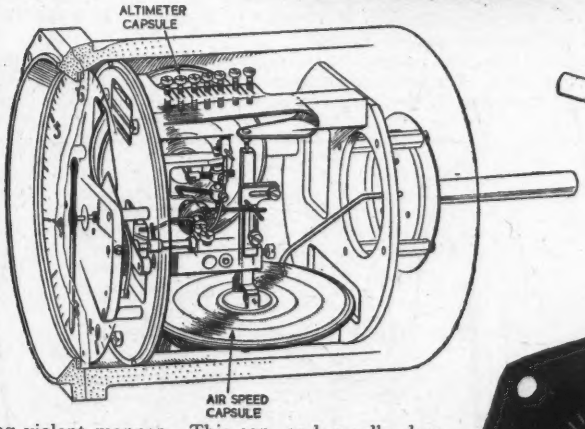
SONIC SPEED WARNINGS

Details of Two New Airspeed Indicating Instruments

SINCE many of the faster types of aircraft flying to-day are capable of speeds at which the airflow phenomenon known as compressibility can have unpleasant, and occasionally dangerous, consequences, some means whereby the pilot can be informed that his speed is getting uncomfortably close to the safe limit is obviously of great value.

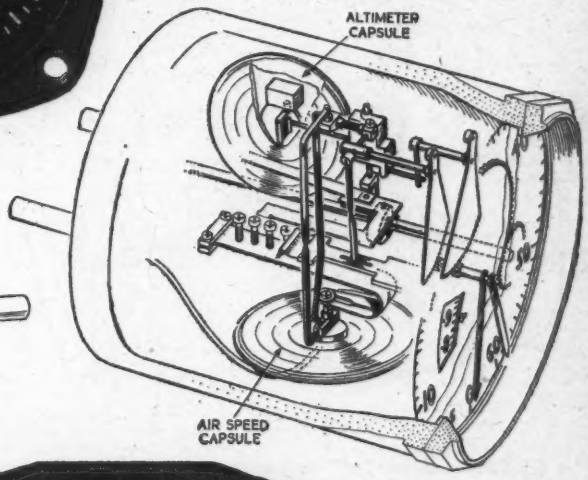
To be brief and, at the same time, to be accurate on this subject of compressibility is not easy; however, we can say that as the speed of the aircraft approaches that of sound, the flow of air past the machine gets disrupted in an increasing violent manner. This can, and usually does, result in unfortunate complications of control with, at times, concurrent structural reactions. As a convenience, the ratio of airspeed to the speed of sound is expressed as a numerical percentage prefixed or suffixed by the word Mach—the name of an eminent German aerodynamicist—and, again for convenience, instead of stating the ratio as, for example, 80 per cent, it is usually designated decimally. Thus 0.8 Mach number means a speed that is 80 per cent of the speed of sound.

(Right) Dial of the maximum safe A.S.I. (civil version), showing normal and limit speed pointers, Mach number setting scale and open calibration for initial 150-kt range of movement. (Below) Detail of Mach meter interior layout showing linkage between capsules and needle.



Sound does not, however, travel at a fixed speed; temperature has a large part to play, and as the higher one goes the colder it gets, it is readily understandable that the speed of sound differs with variations in altitude. At this point it is well, perhaps, to mention the I.C.A.N. standard atmosphere. This is tabulation of pressure, temperature and density values for the atmosphere, which is taken internationally as a datum for all aircraft performance calculations. Since it is manifest that instruments must be calibrated to some fixed datum in order that they will all concur in specific conditions, the standard atmosphere is a convenient reference. In point of fact, as the various "standard" values were originally established as averages of factual conditions taken over a lengthy period, this permits not only a common reference datum for instrument calibration but, in addition, ensures that the values indicated will conform very closely to the true conditions obtaining at any given time. It further permits a pressure-sensitive instrument to be calibrated to a temperature scale—a very useful function.

In the Kelvin, Bottomley and Baird maximum safe-airspeed indicator the pilot is told his airspeed and, at the same time, is also told the maximum safe airspeed at which his aircraft may be flown *at that altitude*. The instrument dial is conventional and is swept by a normal white needle for indicating airspeed. A second needle, coloured red, registers the maximum safe airspeed, this value varying according to altitude directly as the speed of sound varies with altitude due to temperature change. The basic setting of the limit needle is made when the instrument is installed in the particular aircraft according to the maximum known safe speed for the type.



(Above) Interior mechanism of maximum safe-airspeed indicator showing respective linkage trains. (Left) Mach meter dial. Presentation and size is in accordance with standard instrument practice.

We will assume for illustrative purposes that the maximum safe speed for a given aircraft is Mach number 0.78. This will mean that the red needle will indicate a speed of 594 m.p.h. at sea level at an atmospheric temperature of 59 deg. F. When the aircraft is at a height of, say, 12,000ft, the red needle will indicate a speed of 568 m.p.h., since a Mach number of 0.78 is equivalent to a speed of 594 m.p.h. at sea level and 568 m.p.h. at 12,000ft in I.C.A.N. standard atmosphere conditions.

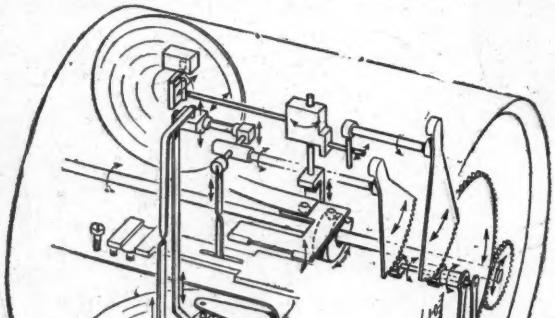
SONIC SPEED WARNINGS

Thus with this new K.B.B. instrument all the pilot has to bother about is to see that the normal needle indicating his airspeed does not overlap or pass the red needle indicating the safe limit. From an installation viewpoint the instrument is the same size and shape as, and is interchangeable with, the standard airspeed indicator.

The mechanism of the instrument is divided into two quite separate elements, each of which actuates its own indicator needle. Airspeed is registered by a conventional sensitive airspeed indicator mechanism, and the limiting safe speed is indicated by an adaptation of a sensitive altimeter mechanism.

The former comprises a phosphor-bronze capsule subjected internally to dynamic pressure ($\frac{1}{2}\rho V^2$), the expansory movement being transferred through a multiplying mechanism to turn the indicating needle. A yoke carried by the capsule terminates at its head with a block to which is anchored a bi-metal link; this in turn carries a further block from which projects a rocking lever. This latter is pivoted on the axis of a shaft which carries a toothed segment meshing with a pinion on the hand staff. Reference to the cut-away drawing and schematic diagram will make clear the operative sequence.

Compensation for three variables is incorporated. The



Schematic diagram of maximum safe A.S.I. operative sequence for each function.

bi-metal link just mentioned compensates for the effect of temperature change on the elastic qualities of the capsule. A push-rod connecting the capsule with a beryllium-copper spring bearing against a series of screws is arranged to compensate for the natural inability of any normal capsule to give true conformity with $\frac{1}{2}\rho V^2$. The screws are pre-set so that the degree of spring tension affords the requisite degree of compensation to capsule movement at any given condition. The third compensation is embodied to allow the first 150 knots (or m.p.h.) range of pointer movement to be large relative to the remaining angular sweep: a tie rod from the rocking lever pierces a spring beam at its foot, the effect being that, after the 150-kt point, the tie rod pulls up against the spring beam, so introducing a resistance to pointer movement for a given degree of capsule effort and thus permitting a closer spacing of the measuring scale.

The limiting safe-speed mechanism comprises a normal phosphor-bronze capsule evacuated to give pressure/height response. Carried on the capsule is a bi-metal strip—to give temperature effect compensation—on which a rocking lever bears, this being a cantilever from an anchor block on a layshaft. Projecting in the opposite direction from the layshaft block is a second rocking lever; this contacts a third rocking lever mounted off the shaft carrying the toothed sector by which the red pointer is driven.

A shaft carrying a cam, against which the end of the layshaft effectively bears as a follower, terminates at a pinion meshing with the toothed periphery of the sub-dial on which the Mach number scale is printed. (This sub-dial lies behind the main dial and is visible through a window cut out in the left-hand side of the instrument face). The camshaft is pre-set from the rear of the instrument case, the appropriate Mach number setting being made when the instrument is installed. Rotation of the cam alters the linear, or axial, position of the layshaft, and, by so doing, alters the effective arm of the segment rocking lever so that the red pointer takes up the requisite position on the dial, and, at the same time, is set to cover the appropriate Mach-number range. A screw-stop is embodied whereby the maximum limit of red pointer travel can be pre-set according to the desired maximum safe speed of the aircraft.

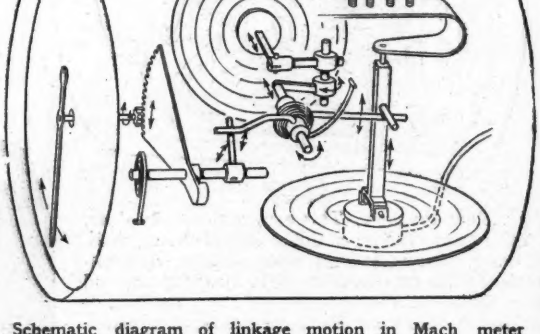
The R.A.E. specification for this instrument called for accuracy tolerances as follows:—

kt. or m.p.h.	kt. or m.p.h.
80 – 200	± 2
200 – 500	± 3
500 – 700	± 5

On the altimeter mechanism the specified requirement was for ±3 m.p.h. limiting speed indication at any point throughout the red-pointer range. Both of these requirements are more than satisfied.

The second of the Kelvin instruments concerned with high airspeed is a Mach meter. Just as the normal airspeed indicator is concerned with indicating the ratio of the aircraft's speed relative to air at rest, so the Mach meter is concerned with indicating a ratio, only in this instance the ratio is that between the aircraft's speed and the speed of sound at any particular altitude at which the machine may be flying.

The Mach meter is, of course, essentially a test instrument. For ordinary purposes a pilot is not interested in the fact that he is flying at a particular Mach number; such



Schematic diagram of linkage motion in Mach meter whereby the operation may be followed.

information is only of use if related to something else, as it would be in the case of test flying.

Unlike the maximum safe-airspeed indicator already dealt with, in which an airspeed and altitude mechanism perform separate functions, the Mach meter airspeed indicating mechanism is subjected to the modifying influence of an altimeter mechanism.

The airspeed capsule is internally subjected to dynamic pressure $\frac{1}{2}\rho V^2$, the capsule carrying a push-rod whose head bears against a beryllium-copper spring set by a series of screws for similar compensation as already described for the maximum safe A.S.I. The push-rod carries a cantilever arm with which a rocking lever on a layshaft is kept in

(*Continued at foot of page* 585)

Constellation on World Tour : Progress with Ambassador : Research Committee

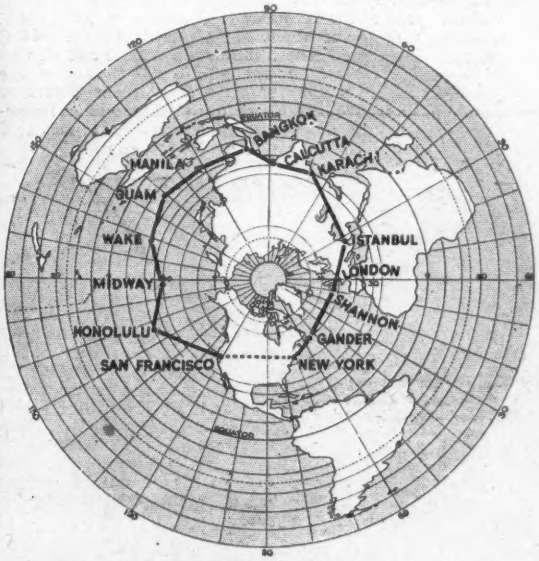
FLYING WHITE HOUSE: President Truman's new Douglas DC-6 which will replace his famous *Sacred Cow*. The conference room is at the rear of the main cabin and is indicated by the three small windows towards the tail.

CIVIL AVIATION NEWS

ROUND THE WORLD BY P.A.W.A.

FLIGHTS round the world have apparently become fashionable again, but Pan American Airways will be the first airline to attempt the operation of a regular service which encircles the world. To inaugurate this service the company are flying the presidents or editors of the leading American newspapers and the Mayor of San Francisco around the route in one of the new Gold Plate model 749 Constellations, *Clipper America*. They were due to leave New York two days ago, June 17th, and land at London Airport yesterday. After a stay of about 15 hours, the next stop was to be Istanbul and from there in one hop to Karachi, and on through Calcutta, Bangkok, Shanghai, Tokyo, Manila, Guam, Wake, Honolulu, San Francisco and the final trans-continental hop to New York. On June 27th the first regular service will be started and from then onwards it will be run once a week in both directions.

The route will be similar to that followed on the special flight except that landings will not be made at Shanghai and Tokyo. The service will be operated in two sections; a Constellation will leave New York every Thursday and, flying eastwards, will arrive at Calcutta the following Monday. A Skymaster will leave San Francisco each Thursday and also arrive at Calcutta the following Monday. The Constellation will then return to New York and the Skymaster to San Francisco. Pan American Airways have not yet received permission to operate across the United States and the Constellation which is due to arrive back in New York on July 1st, will be carrying passengers from San Francisco to New York only because of the special nature of the flight.



The route to be flown by the new Pan American service around the world, north of the equator. The leg to be flown by the domestic operators is shown by a dotted line.

On the inaugural flight the *Clipper America* will take about ninety-three flying hours over an elapsed time for the trip of 336 hours, covering more than 21,000 miles. The regular flights will take about 120 hours including the trans-continental portion of the route which will be flown by normal domestic carriers. Re-fuelling and change-of-crew stops of 1½ hours only will be made on the route. The Gold Plate Constellations are fitted with overload wing tanks and have a permitted all-up take-off weight of 102,000 lb. They have reversible-pitch airscrews, a refrigeration system for cooling the cabin when necessary, and *American Clipper* is fitted with sleeping berths.

INDIAN APPOINTMENT

MR. J. P. JEFFCOCK has been appointed Deputy Director General of Civil Aviation in India.

In 1936 Mr. Jeffcock joined the Civil Aviation Signals Branch at the Air Ministry and in 1941 was lent to the Ministry of Aircraft Production to assist in the development of radar. In 1945 he was transferred to the Ministry of Civil Aviation and lent to the Government of India as the first Director of Communications for Civil Aviation in India. In his new post he is in charge of the Directorates of Air Routes and Aerodromes, Communications and Regulations, and Information and Administration.

Mr. Jeffcock is a pilot and has held an "A" licence since 1938.

The Director General of Civil Aviation in India is Mr. M. I. Rahim.

AMBASSADOR VARIANT

BASIC design of the Ambassador provided for pressurization, but two separate versions were envisaged and in only one of those were the structural requirements for pressurization to be incorporated. Airspeeds, however, have now decided to make all production Ambassadors of the pressurized type, and allow the operators to decide whether or not to make use of it. The production models will be delivered with a pressure fuselage and bulkhead, and each aircraft will be available for operating either in its fully equipped form or stripped of pressurization equipment.

There is an obvious advantage to be gained by the manufacturer in standardized production, but there will also be certain advantages to the operators with only a comparatively small loss of payload in aircraft carrying pressurizing equipment which is not in use. The pressurized version will, as a result, be more quickly available for those operators wishing to use it for all their services, and those operators with unpressurized aircraft will be in a position to modify all or some of them to suit a variety of operations.

At the beginning of this month the first prototype Ambassador was put on the scales and a complete check on early calcu-

CIVIL AVIATION NEWS

lations was made. It is understood that the disposable load of the pressurized version is likely to be within 100 lb of that quoted in 1945, when details were first published. Allowances are, however, being made for possible losses in production, for the pressurization equipment and other contingencies. It must be remembered also that since 1945 the fuselage has been lengthened to allow for the installation of airscrew turbines. The initial calculations were, therefore, on the pessimistic side.

SEABEES TO ITALY

TWO Republic Seabee amphibians have recently been delivered by Rollasons, Ltd., to A.I.A.X., of Milan.

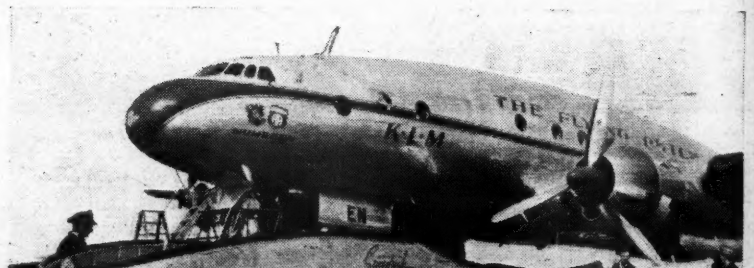
Rollasons are European agents for these American amphibians and after being shipped to this country in crates the aircraft are assembled at Eastleigh. These particular aircraft left the U.K. on Saturday morning, May 31st, and arrived in Milan on Sunday afternoon, June 1st. The Seabees were respectively flown by W/C. Bennett, D.F.C., Sales Director of Rollasons, and Tommy Lucke, who is on leave from B.O.A.C.

We hear, too, that Rollasons have recently delivered a Seabee to Short Brothers, Rochester.

RESEARCH COMMITTEE

THE Minister of Supply, Mr. Wilmot, published recently the terms of reference and names of members of the Civil Aircraft Research Committee and the Aeronautical Research Council. The terms of reference are as follows: (i) to consider the basic research problems arising from the evolution and operation of civil aircraft, having regard, *inter alia*, to the probable requirements of the operators; (ii) to recommend periodically to the Council programes of research; (iii) to report to the Aeronautical Research Council. The names of the members are:

Chairman, Professor A. A. Hall; members, Professor A. R. Collar, Dr. T. E. Easterfield, Professor S. Goldstein, Major F. M. Green, Sir Melville Jones, Professor R. L. Lickley, Dr. H. R. Ricardo, Mr. P. A. Sheppard, Professor G. Temple; and representatives of the Ministry of Supply, the Ministry of Civil Aviation, the National Physical Laboratory and the three Airways Corporations.



LUGGAGE VAN: The first K.L.M. Constellation to be fitted with a Speedpak, the detachable freight cradle, at Schiphol before taking off on a proving flight to Batavia on June 4th. The Speedpak is 33ft long, 7ft wide, 3ft deep and permits 8,000 lb increase in payload. It is carried underneath the aircraft between the wings and weighs 1,800 lb.

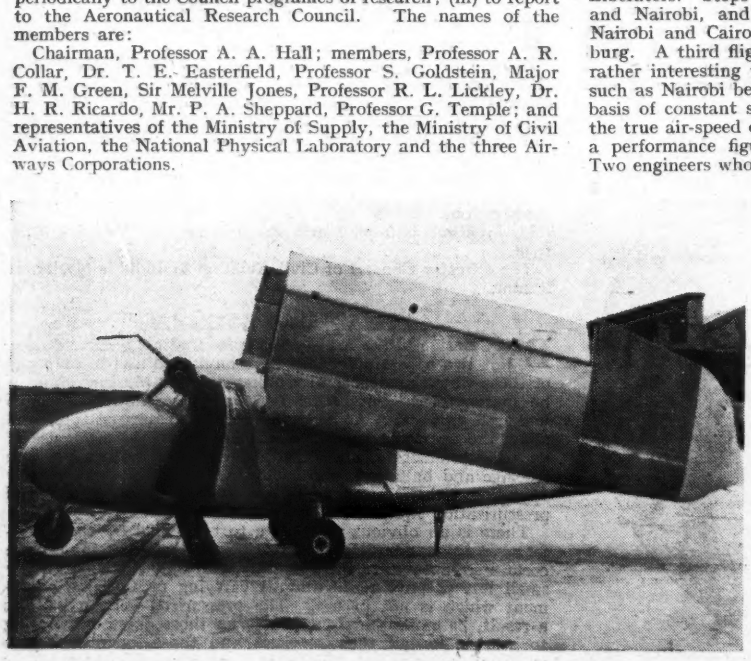
SUCCESSFUL OILFIELD TOUR

THE Bristol Freighter, G/AHJC returned at the end of last month from the tour of Spain, North Africa and the Middle East. In five weeks the aircraft flew 18,000 miles and was in the air about 112 hours.

The Freighter was on an intensive demonstration tour organized jointly by Bristols and Air Work. One week was spent flying in the Persian Gulf demonstrating to the Irak Petroleum Company and another week from Abadan for the Anglo-Iranian Oil Company.

CHARTER TO JOHANNESBURG

TWO charter flights have been made in the last two months to South Africa by Scottish Aviation with their 24-seater Liberators. Stops on the outward flight were made at Cairo and Nairobi, and on the homeward journey at Salisbury, Nairobi and Cairo, only two days being spent at Johannesburg. A third flight is to be made in the near future. It is rather interesting that the Liberator at high-altitude airports such as Nairobi behaved in a perfectly normal manner. On a basis of constant speed range flying and cruising at 10,000ft, the true air-speed of the Liberator is about 200 m.p.h., giving a performance figure of about 1.5 air miles to the gallon. Two engineers who are licensed to inspect, service and sign up the aircraft whilst on the route are carried, but on the charter flights to South Africa a routine 40-hour inspection was carried out by a servicing organization at Johannesburg.



HITTING THE ROAD: "Roadable" private-owner aircraft, which show no signs of increasing in popularity, are not exclusively American. That shown here is an Italian specimen, built by an affiliated concern of Marchetti.

BREVITIES

Negotiations have been started between the Canadian and Peruvian Governments for the extension of Peruvian International Airways' services to Montreal.

* * *

News comes from New Zealand that following the recent successful tour with a Viking and a Freighter in Australia, and the proposal to extend the Freighter tour to New Zealand, demonstrations with other types are likely to follow. A Miles Aerovan will be shipped out to Australia, and a Marathon and a Hermes are also expected. Two Geminis are also going to New Zealand, one for the Public Works Department.

* * *

The American C.A.B. have authorized Air Commuting, an American airline company, to engage in flying passengers and freight between seaplane bases on the

CIVIL AVIATION NEWS

East River, New York City, and communities in Connecticut, New Jersey and New York. The authority lasts for three years and contains the restriction that flights will be made in V.F.R. conditions only. The service is unique in that it will fly aircraft into New York City rather than to an airport serving the city area.

* * *

By meeting the flying tanker 400 miles north of the Azores to refuel, the B.S.A.A. Lancastrian flying on the second U.K.-Bermuda refuelling test flight covered the entire return journey in 13hr 36min.

* * *

Between May 21st, 1946 and May 22nd this year K.L.M. have flown 365 flights across the Atlantic, carrying more than 13,000 passengers. Two round trips each week between Amsterdam and New York were maintained until April, when the frequency was increased to three, and it will be increased again, to four, during this month.

* * *

The Portuguese Government have ordered a number of Skymasters for the use of Transportes Aereos Portugueses. The aircraft are being converted at the Fokker works at Amsterdam and Papendracht. The technical and flying personnel of the Portuguese company have been given an instruction course at the Fokker works and by K.L.M. The first aircraft was taken over at Schipol on May 30th and flown to Lisbon by Capt. Sonderman, the Fokker test pilot.

It is understood that the airfield at Ratmalana, Ceylon, may be developed as an international airport, fully equipped with radio, radar and all the necessary services.

* * *

Swissair now has a fleet of twenty-one aircraft, comprising twelve Dakota passenger aircraft, two Dakota freighters, four DC-4s and three smaller units.

* * *

It is reported that the L.A.M.S. freighter *Port of Sydney*, when flying from New Zealand to Australia, broke the speed record, which was previously held by an American airline's Skymaster.

* * *

Pan American-Grace Airways have made a proving flight from Miami to Buenos Aires, and scheduled services are expected to start with DC-6 aircraft some time this month. The company are awaiting approval from the Civil Aeronautics Board for an agreement between Panagra and P.A.W.A., which provides for the former company's aircraft flying, under charter, over Pan American's routes between Balboa and Miami.

* * *

Mr. H. J. Symington will be retiring from the post of president of Trans-Canada Air Lines within the next twelve months. Mr. Symington has carried on voluntarily since 1941, when, as Canada's power controller, he became president as a wartime measure. Commenting upon the company's deficit of $1,115,000 for 1946, he said it was the first time in ten years of flying that a deficit had been shown. They had, he said, gone through a tough reconversion period, and it would be necessary to load to capacity in order to make money in the coming year.

FROM THE CLUBS

ON only four days during the month of April were aircraft grounded by weather at Sherburn-in-Elmet, home of the Yorkshire Aeroplane Club. One member made his first solo and promptly bought his own Auster, and club members flew a total of 230 hours during the month. S/L. H. N. Gravenor, lately released from the R.A.F., is now manager and chief flying instructor at Sherburn-in-Elmet. A flying control room attached to the clubhouse is now in operation.

* * *

The London Aeroplane Club at Hertford is open five days of the week from 10 a.m. until sunset. The present fleet of the club consists of three Hornet Moths, three Tigers and one Auster. A total of 100 flying hours was exceeded during April. Incidentally, Major Duncan Smith, of Leopoldville, whom readers will recall took delivery of the Auster flown there by D. W. Weaver (described in *Flight* of May 1st and May 8th) was one of the club's first post-war new members.

The R.A. Aero Club rally, planned to take place last week-end, was cancelled owing to bad weather. The R.A.A.C. ball, however, was held last Friday and proved a great success.

* * *

The Reading Aero Club, which operates from Woodley airfield, has not yet been able to obtain its pre-war premises, which are still requisitioned. However, visitors will find the temporary club site amongst pleasant surroundings on the east side of Woodley airfield. The club is fully licensed and a snack bar is being organized. Three Miles Hawk Major aircraft and two Whitney Straights are shared amongst the club's sixty members. Hangar accommodation is available for private owners, and a full maintenance service is in operation.

* * *

Around this time last year ex-Service members of the American Embassy, exercising their G.I. Bill of Rights, purchased four Piper Cub aircraft. From this beginning grew the American Embassy Flying Club, now with thirty-six members, operating from White Waltham and affiliated to the West London Aero Club. Miss Anne Long, who is acting president of the club, obtained her "A" licence recently under the able instruction of Bill Hampden, of the West London Club. One of the club's Piper Cubs has now been "cannibalized" to obtain spares and replacement for the other three, but the club are hoping to purchase more aircraft before long.

EMBASSY ENTHUSIASTS: Six members of the American Embassy Flying Club which has three Piper Cub aircraft and operates from White Waltham are (L. to R) Mr. Bellard D. O'Neill, Capt. T. Hall, Miss H. Hendry, Miss Anne Long, Miss H. Kane, and Mr. James Rush.

* * *

The Midland Aero Club, Ltd., which, incidentally, was founded as long ago as 1909 to "promote the science, industry and sport of aviation," at present has 200 flying members. Four aircraft (three Austers and one Tiger Moth) are operating from Elmdon Airport under the club's two instructors, Mr. D. S. Scoffham, D.F.C., and Mr. D. A. Arch. The new club premises were opened at the end of last month, the occasion being marked by a social evening, the success of which has prompted the M.A.C. to hold a similar party on the last Saturday of each month. Non-flying members are well catered for, and two hard tennis courts are now available at the club. It is proposed to hold an Air Rally and "At Home" on August 16th of which further details will be announced later.

Super Cruiser in the Air

Description and Flying Characteristics of Piper's Three-Seater with 100 h.p. Lycoming Engine

A well-designed cowling encases the flat-four Lycoming engine in the Piper. Aerodynamically the whole aircraft is very clean.

AT Fair Oaks last week I was given the opportunity of flying the first, and I believe only Super Cruiser PA-12 registered in this country. It was brought over as a demonstrator some months ago but is now privately owned. The British agent, Mr. A. J. Walter, is at present in America negotiating the delivery of more cruisers and their spares, and although they will mostly be for re-export, a permit to sell a small percentage in this country will probably be granted. The selling price in America is approximately £735. If numbers sold by a manufacturer can in these days be taken as an indication of popularity as well as availability, American personal aircraft delivery figures for January and February of this year are significant. Some respective totals for comparison were:

Maker	*January*	*February*	*Maker*	*January*	*February*
Aeronca ..	161	173	North American	238	221
Beech	1	12	Republic ..	103	126
Cessna ..	420	310	Stinson ..	236	247
Erco	124	118	Taylorcraft ..	31	42
Luscombe ..	120	81	Piper	665	571

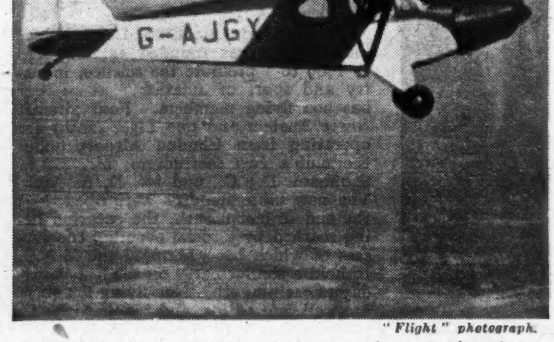
The total of all types was 2,179 and 1,980 respectively. Size, cost and number of models must, of course, be taken into consideration, and Pipers produce both Cub and Super Cruiser in quantity, whilst their new Skysedan may also account for a small number.

The PA-12 is fabric covered and has a steel tube fuselage and light alloy mainplane structure. A neat fixed undercarriage with doughnut tyres, brakes and rubber shock absorption is fitted, and the tailwheel, which is sprung, is steerable from the rudder bar. The pilot sits forward and two passengers can sit side by side behind him. For instruction one man can sit in the middle of the rear seat, and rudder pedals and removable stick are provided. This three-seat arrangement seems best suited to light taxiwork since it is somewhat unfriendly for private use, the pilot always being on his own. However, he has the advantage of plenty of freedom of movement. Three is said to be no company at any time so perhaps the point is unimportant. Certainly I can say from experience that the two rear seats are very friendly and although a tight fit, they are not uncomfortable for a short trip.

Good load for a long distance is a talking point of the Super Cruiser, which, in addition to three people, can carry 40 lb of luggage for 600 miles. The fuel tanks are in the wings—19 gallons on each side—and each has a gauge and a large easily moved tap in the cockpit.

When taxying, direction can be controlled quite well with steerable tailwheel alone and no brake, but one's foot slips off the smooth tubular pedals very easily. This is no reflection on springing of the machine which is very satisfactory. A parking brake lever is placed on the left side below the instrument panel, and fiddling little heel brake pedals work in conjunction with it. I have yet to be convinced that for convenient operation there is anything to beat toe brakes, if feet are to be used as I think they should be.

The Lycoming o-235-C 100 h.p. flat four is a smooth and quiet little engine, and I was impressed with the way it performed and handled. The electric starter shows automobile influence both in appearance and being attached under the nose with a bendix pinion engaging a large open spur gear behind the airscrew hub as if on a flywheel assembly. A hot air intake is provided, and the enclosed main air intake inside the engine port cooling air scoop has a filter.



"Flight" photograph.

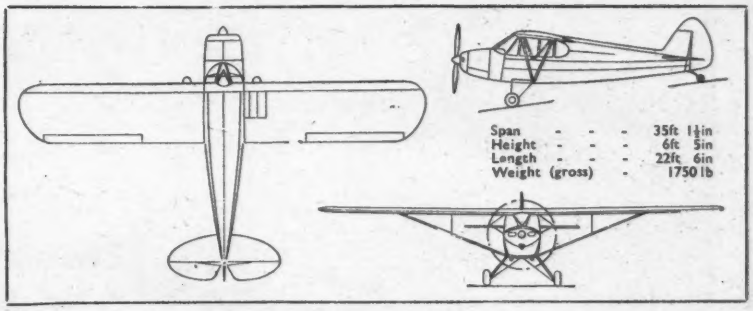
The PA-12 has a good performance when carrying three people, with a maximum of 100 h.p. available. It is here seen flying in the Fair Oaks area.

Airborne

With two up the take-off was short and a comfortable "unsticking" speed was about 60 m.p.h. A good steep climb followed into a fairly strong wind at an airspeed of 75 m.p.h. The rate of climb given by the makers is between 500 and 600 ft/min. A weakness of this small aircraft, as supplied, is the complete absence of any flying instruments. Fine weather aircraft are of little use in this country but there seems to be room to fit one or two dials to overcome the deficiency. The centre of the panel is taken up with a tiny radio receiver to be replaced on later models with an equally small two-way set. I am told that met. gen and the beam come through quite well on the present receiver.

At somewhat reduced weight "chandelles" and other aerobatic manœuvres may be made, but I did not try any having a passenger, no previous knowledge of the machine, and no parachutes. At a safe height, however, I tried reproducing the motions of some of my worst wartime "ab nits," for example, prolonged climbing turns with no speed to speak of, but plenty of rudder and some opposite stick. The result was most unspectacular. With forearm aching from holding the stick back, the cruiser managed a slow sink of nose and outside wing. Rechecked in both directions, it was still the outside wing that stalled. A similar sort of test on gliding turns resulted in a gentle mush with loss of bank and then immediate recovery. Although there is no claim to be a "safety 'plane," it was apparent that the Super Cruiser is singularly viceless and gentle around the stall. All ordinary flying manœuvres,

SUPER CRUISER IN THE AIR



including steep turns, are made pleasantly and easily, and the field of vision to the rear is better than I had expected. It is in a turn and when looking round on the ground before take-off that the high wing gives most obstruction to vision.

By comparison with other aircraft in its class the PA-12 has a heavy stick and considerable pressure with the minimum of feel is needed for fore and aft changes at cruising and high speed. Near the stall, when holding off to land, the feel in the elevator control returns. Quite considerable use of fore and aft trim is also required for the approach and in the air generally. This is provided by varying the tailplane incidence with the use of a handle on the pilot's port side. At 70 to 75 m.p.h. gliding speed the descent is quite steep, and at a rather lower speed there seemed to be a quite pronounced though fully controlled sink. No flaps are fitted, but if need be, the machine sideslips quite nicely. Landing presents no difficulties but it is a common fault at first to touch down tail first and then due to the sensitive steerable tailwheel to cause slight swings in correcting real or imaginary ones.

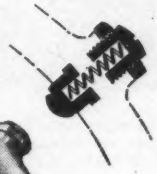
The claimed speeds of 115 m.p.h. all out and 103 m.p.h. cruising seem fair, but the Cruiser I flew stalled at 52 to 54 m.p.h., two up, at 1,500 ft by the A.S.I., which was well taped to overcome a tendency to stick. The maker's figure, three up, is 48 m.p.h.

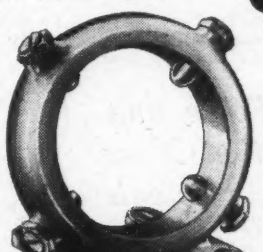
For a light aircraft of its power and capacity I would assess the PA-12 as above average on performance. Its general feel is of a rather larger and more powerful machine, which is an advantage, and it really flies as opposed to becoming and remaining airborne as a result of certain control movements.

CONTROL LINKAGE BEARING

A NEW type of bearing for use with the standard 1¼in o/d tubes of control transmission linkages has been developed by Thomas L. Marshall, 46c, Dennington Park Road, N.W.6. This new form of bearing offers advantages over the conventional usage of trefoil rollers or composition guides.

Four quadrantally disposed spring-loaded Oilite nodules housed in an annular carrier provide the bearing and guide media, and since the nodules are hemispherically profiled, contact with the tube is virtually frictionless.





A typical unit of the new Marshall linkage bearing.

The current practice of tube support is such that allowable deformation tolerances of the tubes are very small and this incurs a relatively high scrap factor. It is claimed that the flexibility of the new bearing will eliminate a large proportion of present tube scrapping and, in addition, the following advantages are embraced: (i) self-alignment; (ii) low-friction contact; (iii) accommodation of torque- or push-pull tubes; (iv) no need for lubrication; (v) non-jamming and unseizable; (vi) fitter's time cut down to a minimum; (vii) invulnerability for military aircraft. In the latter connection, it was demonstrated to *Flight* that, even when a tube was subjected to the impact of two low-calibre bullets and severely deformed, it was still capable of unimpaired movement in the bearing.

The new bearing is made in a standard form for use with normal 1¼in tubes, and can be obtained either as a bought-out part or can be made under licence from the inventor should a manufacturer so wish.

NEW B.O.A.C. SERVICE TO HONG KONG

TO supplement the present once-weekly service operated by B.O.A.C. Hythe flying-boats, a new once-weekly service will be inaugurated by B.O.A.C. on Monday, June 23rd. Plymouth class flying-boats are to be employed and they will leave the passenger terminus at Poole, Dorset, every Monday. Stops will be made at Augusta, Cairo, Bahrein, Karachi, Calcutta, Rangoon and Bangkok. The journey will take approximately seven days and the single fare is £170, return fare £306. Seats are available for non-priority passengers. It is intended that Plymouth class flying-boats will eventually replace the Hythes at present in service on the Far East route. The Short Plymouth class flying-boat accommodates 22 passengers in addition to freight and mail.

SONIC SPEED WARNINGS

(*Concluded from page 580*)

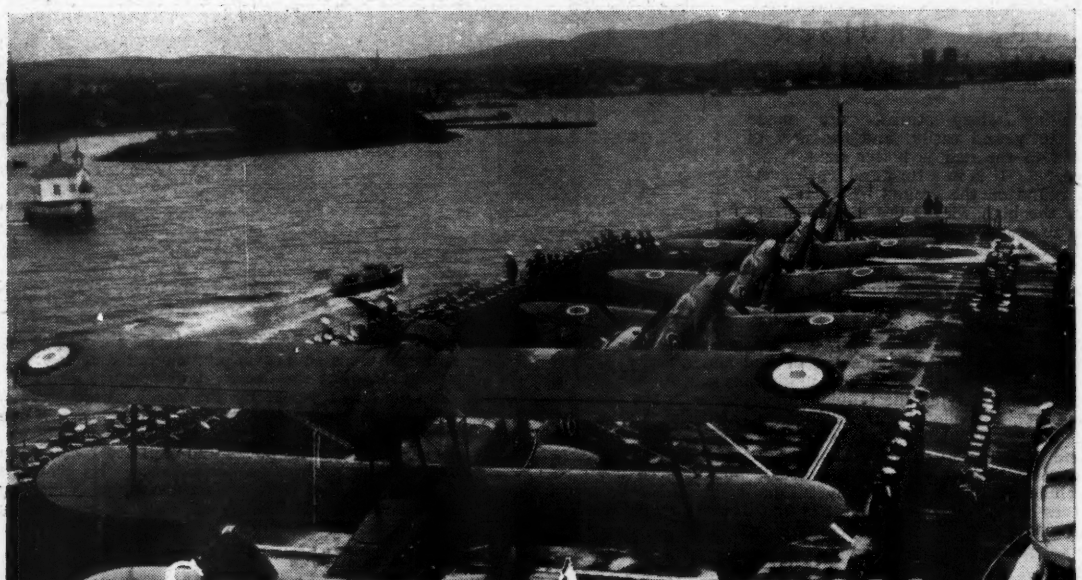
contact by a hair spring. An opposite rocking lever of the layshaft contacts a third rocking lever carried off the shaft on which the toothed segment is mounted for driving the indicating needle.

Correction for altitude—which in this case is effectively correction for temperature—is provided from an evacuated twin-capsule unit, sensitive to pressure change. A connecting rod from the capsule is pivoted at its head to a cross arm carried on a layshaft. Immediately below the cross arm a cantilever is carried off the layshaft, and this bears against the end of the airspeed linkage layshaft. Expansory movement of the altimeter capsule will lead to the airspeed linkage layshaft being moved axially, and this will alter the effective arm length of the segment shaft rocking lever. In this way altitude effect is compensated since, by altering the lever arm, the degree of pointer movement for a given capsule movement is varied.

The Kelvin Mach meter is calibrated to an accuracy of ±0.01 Mach number over its whole indicating range throughout a temperature range of from −20 to +50 deg C, and also functions satisfactorily after subjection to "overload" temperatures of −40 and +70 deg C.

FORTHCOMING EVENTS.

June 20th and 21st.—Derby Aero Club: International air rally. Burnaston Airport.
June 21st to 29th.—British Gliding Association: National Gliding Contests. Bramcote airfield, Nuneaton.
June 21st. and 22nd.—Aero Club de l'Ouest de la France. International air rally, Angiers.
June 21st. to 23rd.—Aero Club of Namur: International air rally.
June 22nd.—Swiss Aero Club: International model contests.
June 25th.—S.B.A.C. Annual General Meeting.
June 28th.—South Coast Flying Club: Tea patrol, Shoreham Airport.
June 28th and 29th.—Luton Flying Club: Summer meeting, display and competitions.
June 28th to 30th.—Aero Club of Le Puy en Velay: Rallye Lafayette.
June 29th.—Auster Flying Club: Annual air rally. Rearsby airfield, Leicester.
July 2nd to 23rd.—Air League of British Empire: Blackpool (Squires Gate) Flying displays with R.A.F. support on 9th, 16th and 23rd.
July 4th to 20th.—Brussels International Aero Show.
July 6th.—Gloucester Flying Club: At Home and flying display, Staverton airfield.
July 12th to 14th.—Deauville International Air Rally.
July 13th.—Royal Aero Club of Belgium: International flying meeting at Liege.
July 19th to 21st.—International Air Rally at Knocke Le Zoute.
July 30th to August 9th.—Aero Club of Switzerland: International gliding contest. Samaden in the Engadine.
August 9th and 10th.—Southend flying meeting.
August 30th and 31st.—Cinque Ports Flying Club: Flying meeting at Lympne airport.
Sept. 3rd to 6th.—Royal Aeronautical Society: Aeronautical Congress.
Sept. 9th to 12th.—S.B.A.C. Exhibition and Display.



APPROACHING OSLO: Bearing Admiral Sir John Cunningham, the First Sea Lord, the carrier H.M.S. *Vengeance* has been visiting Norway. Soon after arrival Admiral Cunningham was decorated by the King of Norway. Our picture shows *Vengeance*, with Sea Otters and Seafire XVIIs, approaching Oslo.

Appointments

THE Air Ministry announces that His Majesty the King has approved the following appointments, with effect from June 1, 1947:—

Honorary Physician to His Majesty—A. Cdre. Thomas McClurkin, M.B., B.Ch., D.P.H., Dip. Bact., D.T.M. and H., in succession to A.V-M. Kenneth Biggs, C.B.E., M.C., M.R.C.S., L.R.C.P., D.P.H., who has retired from the Royal Air Force.

Honorary Surgeons to His Majesty—A.V-M. Duncan McLaren, C.B.E., M.B., Ch.B., and A. Cdre. Frederick John Murphy, C.B.E., M.B., B.Ch., D.P.H., in succession to A.V-M. Arthur Edward Panter, C.B., M.R.C.S., L.R.C.P., and A.V-M. Thomas James Kelly, C.B.E., M.C., M.D., B.Ch., who have retired from the Royal Air Force.

A. Cdre. McClurkin has been at the Air Ministry as Director of Hygiene since February, 1941, and was formerly Deputy Principal Medical Officer (Hygiene), Technical Training Command. Born in January, 1893, at Belfast, he received his medical training at Queen's University, Belfast, and qualified in 1915. He was commissioned in the medical branch of the R.A.F. in 1922 after service in the R.A.M.C.

A.V-M. McLaren is Principal Medical Officer, R.A.F. Mediterranean and Middle East Command, and before taking up this appointment in March, 1946, he held a similar post at Transport Command Headquarters. From June, 1942, to November, 1945, he was at the Air Ministry as Deputy Director-General of Medical Services. At the outbreak of war he went to France as Principal Medical Officer, Advanced Air Striking Force. He was born in Glasgow in April, 1893, and took his medical degrees at Glasgow University in 1916. Before being commissioned in the R.A.F. in 1920 he served for four years in the R.A.M.C.

A. Cdre. Murphy has been Principal Medical Officer, Bomber Command, since September, 1945, and was formerly P.M.O., 2nd Tactical Air Force, from October, 1943. He was born in September, 1892, at Rathcove, Meath, and was trained in the Medical Schools of Dublin University, where he qualified in 1916. After service in the R.A.M.C. he transferred to the R.A.F. in 1918.

Royal Air Force and Naval Aviation News and Announcements

Sgt. Hannah's Funeral

FULL R.A.F. honours were paid at the funeral of ex-Sgt. John Hannah, V.C., at Birstall, near Leicester, on Wednesday last week.

Electrical Officers Association

AT the first reunion dinner of the Electrical Officers Association (R.A.F.) held on May 31st, G/C. C. C. Bazell, A.M.I.E.E., as chairman, gave details of the splendid work done by electrical officers during the war, and G/C. T. V. Lister, A.M.I.E.E., made some pointed contrasts between his civilian and Service experiences. Membership of the Association has now reached a total of 240, and the reunion was attended by 91 electrical officers from all parts of this country and from Germany.

The secretary and treasurer is F/L. R. H. M. Upfold, 46, Kensington Hall Gardens, Beaumont Avenue, W.14.

King's Birthday Celebrations in Singapore

A METEOR IV made its first appearance over Singapore Island when it took part in the fly-past during the King's Birthday Parade in Singapore on Thursday, June 12th. The salute was taken by the officer administering the Government, Mr. P. A. B. Kerron, and the A.O.C., Malaya, A.V-M. J. D. Breakey, C.B., D.F.C., was present.

The fly-past was led by twelve Spitfires under the command of S/L. I. G. Broom, D.S.O., D.F.C. Naval Seafires and Fireflies also took part. Three Mosquitoes, five Beaufighters and one Sunderland of the R.A.F., based at Seletar, flew over various towns in Sarawak, including Kuching and Sibu.

A.T.C. for Canada

TWO Yorks of Transport Command will carry to Canada on August 18th forty-six A.T.C. cadets, chosen from all over Britain. A similar number of young Canadian members of the Air Cadet League of Canada will arrive here on July 31st for an eighteen-day tour.

The Canadian tour arranged for the A.T.C. cadets will take them from Montreal to the Pacific Coast, back to the Atlantic seaboard then on to Montreal for home. On the westward trip to Patricia Bay (British Columbia) they will visit Ottawa, R.C.A.F. centres, Regina (Sask.), Lethbridge (Alberta), and Vancouver, flying over the heaviest mining area in Canada, a big game forest, the prairies of Manitoba and Saskatchewan, the ranching country of Alberta, and the Rockies. On the Atlantic coast they will visit Prince Edward Island, Nova Scotia and New Brunswick.

SERVICE AVIATION

Vampires—Hot and Cold

A DE HAVILLAND Vampire jet fighter is about to undergo tropical trials at Khartoum and in Canada winterization trials have been completed by a similar aircraft. This was fitted with long-range tanks and experience was obtained in operations at temperatures as low as minus 40 deg. C.

It is now known that the Goblin-engined Vampires ordered for the Royal Canadian Air Force will equip both regular and auxiliary squadrons. The de Havilland Aircraft of Canada, Ltd., is providing servicing and maintenance courses for officers and airmen on the Vampire airframe and Goblin turbine jet.

A.T.C. on Parade

A.V-M. SIR ALAN LEES, accompanied by A. Cdre. Sir Harry Broadhurst, on Monday of last week inspected A.T.C. squadrons Nos. 18F (Wimbledon), 43F (Merton and Morden) and 565 (Raynes Park County School).

After complimenting the squadrons on the smartness of their parade, Sir Alan pointed out to the boys advantages that accrue to members of the A.T.C. who decide to make the R.A.F. their career. Earlier the same evening, at an informal dinner given to the visiting and A.T.C. officers by Alderman Black, the Mayor of Wimbledon, Sir Alan said that he expected an improvement in the ranks granted to A.T.C. officers, and that the equivalent pay of these higher ranks would be paid for periods spent in camp. Another forecast he made was that officers in future will be entitled to a free issue of uniform.

A.A.F. Appointment

THE Air Ministry announces the following Auxiliary Air Force appointment:—

W/C. John Higson Smith to command No. 3505 (East Riding) Air Defence Unit, Auxiliary Air Force.

W/C. Smith was commissioned in 1933 in No. 503 (County of Lincoln) Squadron, Special Reserve, later absorbed into the Auxiliary Air Force. In 1938 he passed to the A.A.F. Reserve of Officers and was called out for service in August, 1939. During the war he served for a few months with No. 616 (South Yorkshire) Squadron and was for the four years from March, 1940, at the Air Ministry in the Directorate of Operations and Intelligence in the department of the Chief of Air Staff. This was followed by eighteen months on Air Defence duties in the Directorate of Operations, Air Ministry, prior to his release from the Service in October, 1945.

R.A.F. Association Meet

A RESOLUTION expressing very great disappointment that the services rendered by Marshal of the R.A.F. Sir Arthur Harris from 1942 until the end of the war had not been recognized was passed by a large majority at the annual conference of the R.A.F. Association.

Air Marshal Sir Robert Saundby, the chairman, pointed out that in the past year expenditure by the Association had exceeded income by nearly £4,000; this year the deficit was likely to be considerably greater. There were now over 450 branches of the Association, said Sir Robert, and the membership was 158,000. During the year the welfare section had dealt with 4,000 cases and conducted 340 successful appeals concerning grants, licences and Ministry of Labour courses.

"*Flight*" photograph.

"PREP" FOR THE SERVICE: Air Vice-Marshal Sir Alan Lees inspecting No. 565 (Raynes Park County School) Squadron, A.T.C., at the H.Q. of the Wimbledon Squadron. He is attended by F/O. W. Cousins, S/L. S. Black and A.Cdre. Sir Harry Broadhurst.

Not for Great-Grandson

THE great-grandfather of A.V-M. T. G. Bowler, C.B.E., lately promoted to the acting rank of Air Vice-Marshal on taking over command of No. 40 Group, Maintenance Command, at Bicester, gave his name to the bowler hat. He designed it to the order of a Mr. William Coke, who wanted "a hard hat to wear when he went shooting," and after whom it was often known as the "billycock."

Badge of No. 182 Squadron, R.A.F. "Fearless I direct my flight."

Badge of No. 195 Squadron, R.A.F. "Velocitate fortis" (Strong by speed).

The Weather Ships

THE four ex-Naval *Flower* class corvettes which are now being converted for service as ocean weather ships for the meteorological office of the Air Ministry have now been renamed. The new names (the originals are given in parentheses) are: *Weather Observer* (Marguerite), *Weather Recorder* (Genista), *Weather Watcher* (Snowflake), and *Weather Explorer* (Thyme). The former prefix "H.M.S." now becomes "O.W.S.," denoting "Ocean Weather Ship." *Observer* and *Recorder* are at Sheerness and Devonport respectively, and the other two are at Rosyth. Two ships will patrol at a time, two being held in reserve. Crews are now being recruited and *Weather Observer* will probably sail for her station in mid-July. It is hoped that the other three will follow her at fortnightly intervals.

Service Basketball

THE Royal Air Force is forming its own Basketball Association and the first inter-Service championship games are likely to be held next winter, similar associations having already been formed by the Army and the Royal Navy. The secretary of the R.A.F. Sports Board at the Air Ministry is receiving applications for membership, and a meeting, followed by competitive games within the R.A.F., will take place in July or August.

Basketball is considered to be not only good training for all forms of sport but a very useful game on a wet winter's evening where an empty hangar is available.

Reunions

TO-NIGHT—June 19th—a special R.A.F. Gala Ball will be held at the Lyceum Theatre at 7.30. The theatre has been booked for the evening by the Air Ministry to raise funds for entertaining our Service Allies who will be competing for the Britannia Shield. Full support will be given by "The Lyneham Reunion," who have taken a special box, and by the "Chesterfield Club." Most of the members of the Air Council have promised to attend.

* * *

All officers of the British, Dominion, Colonial and Allied Air Forces who were in German or Italian prisoner of war camps, and officers of British or Allied fighting forces who were in camps for Air Force P.o.W.s, are invited to a reunion party to be held at Dartmouth House, 37, Charles Street, Berkeley Square, W.1, at 6.15 p.m. to-morrow night (June 20th).

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

A.F.V. RECOGNITION

Feline Parenthood Questioned

REFERENCE your article "Five Days with B.A.F.O." and the photograph and caption on page 515 of a "battered and burnt Tiger tank." Although we are unlikely again to meet Tiger or Panther tanks, in view of the fact that the demonstrations referred to were to do with Army co-operation, somebody's A.F.V. recognition has slipped badly as the tank shown in the photograph is a "Panther" tank mounting a long 7.5 cm gun and not a "Tiger."

A Tiger suspension had nine bogey wheels in pairs, the tank shown has only eight bogey wheels, an idler and driving sprocket. If it had been a Tiger tank with a sloping front plate it would have been a King Tiger and would have had an 8.8 cm gun in a round mounting, also the side armour plates sloping towards the rear. D. KEW (Ex-R.A.C.).

[*The author of the article affirms that two Army officers witnessing the demonstration assured him that the target was a Tiger—possibly a King Tiger, suggested one—but positively of the* genus *Tiger.*—ED.]

CASTERING UNDERCARRIAGES

A Successful Tricycle

IT was with great interest that I read the letter on cross-wind landing gear by Mr. T. P. Wright, and your Editorial, "Back to Blériot?" in *Flight* of May 29th. I am the inventor and designer of the Helmy self-correcting undercarriage. My first provisional patent was taken out in 1943.

The wheels of this undercarriage absorb automatically all or any combination of the three main shocks (up and down, fore and aft, and sideways). It was fitted to Aerogypt Mk. IV. From 1944 onwards Mr. R. H. Henderson carried out all the necessary test-flying till 1946, when the aircraft was given a limited C of A for the purpose of flying it to Egypt.

I can only mention that after renewing my A licence I flew this twin-engined aircraft alone, without any tuition, on my very little limited experience. It can be landed at any speed, at any drift, from the stalling speed to nearly its cruising speed. In fact, one just aims the aircraft to the point on which one wants to land; speed does not matter. Take-offs and landings are the easiest part in flying this machine.

The M.A.P. view at the time was: It is bound to shimmy sooner or later. But over 600 take-offs and landings were executed by Mr. Henderson without the slightest sign of shimmy, and at times with 20 deg of drift. All these tests were done at White Waltham airfield (which is a grass field), but high-speed and manœuvring tests were done on the tarmac and perimeter, without any sign of shimmy. The machine taxies well on one engine without brakes.

Unfortunately, Aerogypt Mk. IV crashed when I was piloting it, landing at Northolt to clear customs on my way to Egypt in November, 1946. The tailplane caught an unseen barbed wire, which was some feet higher than the fence.

You will see from the foregoing that development in this country in that particular sphere was well ahead of U.S.A. I have added more improvements to this type of undercarriage to make it lighter and simpler. These will be incorporated in the new Aerogypts, which I am building now.

S. HELMY.

Some Blériot Recollections

I WAS much interested in your Editorial in the May 29th issue of *Flight*, and also in Mr. T. P. Wright's letter dealing with the subject of castering undercarriages.

Prior to the 1939-45 war I managed to accomplish up to about five hours' flying on Blériot Type XI and XXVII aircraft, mainly in test-flying between the hours of 5 and 8 a.m. From this experience I could not understand why the castering feature was not incorporated in modern aircraft. During these experiments I found that I could take off and land up to about 40 degrees off-wind without difficulty, but it was important that the coil springs which were fitted inside the undercarriage vertical tubes, and which controlled the automatic centring, were correctly tensioned.

If these springs were too weak, the aircraft could not be properly controlled by the rudder, especially on rough grass with slight mounds; and if too strong the machine had a tendency to turn over sideways. Again this depended to a certain extent on the aircraft, there being less tendency on the 1909-10 Type XI Blériot, which had a track of approximately 6ft and a tail wheel, than with the 1911 Type XXVII with 5ft track and tail skid.

For application to modern aircraft, a clutch or similar device would appear to be necessary for each wheel for taxying purposes; these could then be disengaged for take-off and landing. I also see improvements such as radio ground control for setting drift through the automatic pilot, and electrical devices for pre-setting each wheel to the approximate angle; this would eliminate any serious wheel flick.

In view of your discussion I thought these notes might be of interest. R. G. J. NASH.

[*We hesitate to dispute any statement made by Mr. Nash, who has, or has had, in his possession at his museum at Brooklands, several of the early Blériot monoplanes; but to the best of our recollection the castering wheels of the Blériots were centred not by coil springs inside the vertical undercarriage tubes but by "bunjie" in the wires which braced the rectangle formed by the fixed cross-member of the undercarriage, the wheel forks and the cross-tube which connected the two wheels. We distinctly recall the short lengths of "bunjie," but these may have been additional to coil springs in the vertical tubes.*—ED.]

A 1938 Westland Experiment

IN view of Mr. T. P. Wright's most interesting letter in *Flight* of May 29th, arguing the case for the automatic operation of castering, it may interest your readers to know that as far back as 1938 Westland Aircraft, Ltd., applied this particular principle to a Lysander. The Dowty internally sprung wheel was modified to give castering by means of an ingenuous cam mechanism, and a normal external long-stroke oleo leg was substituted for the original springing. It was considered that an aircraft fitted with such an undercarriage might find very valuable application in warfare, since it could be landed on Continental roads irrespective of wind direction.

The Westland Lysander castering undercarriage referred to in Mr. Penrose's letter.

I made a great number of flights with this modified Lysander and not only found that it would run straight when landed across wind, but also used to let it skate on to the ground when making the long and heavily yawed sweeps associated with crazy-flying. There was no doubt whatsoever that one could afford to be very careless when landing a machine fitted with a castering undercarriage.

There was slightly increased difficulty in turning the machine when taxying, but doubtless this could have been overcome had not the experiments been abruptly dropped owing to pressure of work caused by general re-armament.

H. J. PENROSE,
Chief Test Pilot.